

The Commission on Ecology
of the International Union for Conservation of Nature
and Natural Resources

International Council for
Bird Preservation (ICBP)

International Wildfowl
Research Bureau (IWRB)

Proceedings of a Technical Meeting on Wetland Conservation

Ankara - Bursa - Istanbul

9 to 16 October 1967



Published with the assistance of UNESCO

International Union
for Conservation of Nature
and Natural Resources

Union Internationale
pour la Conservation de la Nature
et de ses Ressources

Morges, Switzerland 1968

The International Union for Conservation of Nature and Natural Resources (IUCN) was founded in 1948 and has its headquarters in Morges, Switzerland; it is an independent international body whose membership comprises states, irrespective of their political and social systems, government departments and private institutions as well as international organisations. It represents those who are concerned at man's modification of the natural environment through the rapidity of urban and industrial development and the excessive exploitation of the earth's natural resources, upon which rest the foundations of his survival. IUCN's main purpose is to promote or support action which will ensure the perpetuation of wild nature and natural resources on a world-wide basis, not only for their intrinsic cultural or scientific values but also for the long-term economic and social welfare of mankind.

This objective can be achieved through active conservation programmes for the wise use of natural resources in areas where the flora and fauna are of particular importance and where the landscape is especially beautiful or striking, or of historical, cultural or scientific significance. IUCN believes that its aims can be achieved most effectively by international effort in co-operation with other international agencies such as UNESCO and FAO.

The World Wildlife Fund (WWF) is an international charitable foundation for saving the world's wildlife and wild places. It was established in 1961 under Swiss law and shares joint headquarters with the International Union for Conservation of Nature and Natural Resources (IUCN). Its aim is to support the conservation of nature in all its forms (landscape, soil, water, flora and fauna) by raising funds and allocating them to projects, by publicity and by education of the general public and young people in particular. For all these activities it takes scientific and technical advice from IUCN.

Although WWF may occasionally conduct its own field operations, it tries as much as possible to work through competent specialists or local organisations.

Among WWF projects financial support for IUCN and for the International Council for Bird Preservation (ICBP), together with the International Wildfowl Research Bureau (IWRB), have highest priority, in order to enable these bodies to build up the vital scientific and technical basis for world conservation and specific projects. Other projects cover a very wide range from education, ecological studies and surveys, to the establishment and management of areas as national parks and reserves and emergency programmes for the safeguarding of animal and plant species threatened with extinction.

WWF fund-raising and publicity activities are mainly carried out by National Appeals in a number of countries, and its international governing body is made up of prominent personalities in many fields.

The Commission on Ecology
of the International Union for Conservation of Mature
and Natural Resources.

International Council for
Bird Preservation (ICBP)

International Wildfowl
Research Bureau (IWRB)

PROCEEDINGS OF A
TECHNICAL MEETING ON WETLAND CONSERVATION

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INTRODUCTORY NOTE

This Volume in IUCN's New Series contains the Proceedings and Papers of a Technical Meeting organized by IUCN's Commission on Ecology under the programme approved by the Union's 9th General Assembly (1966). The aim of the Meeting was to promote an ecological approach to the conservation problems of the Near and Middle East Region, with special reference to the key role of wetlands and to the desirability of extending to the Region the MAE Project for conservation and management of wetlands, launched by IUCN, ICBP and IWRB in 1962. The proposed venue for the Meeting was Turkey.

At an early stage of the organization of the Meeting, the Commission learned that the Asiatic Wildfowl Working Group, which is conducting a long-term Wildfowl Survey in Asia under the auspices of IWRB and the Wildfowl Trust and with the financial assistance of the World Wildlife Fund, was also planning a meeting at the end of 1967, to be held in Iran. This would have been directed mainly to wildfowl conservation and management, but would also clearly have involved wildfowl habitats, including most of the wetlands of the Region with which IUCN's proposed meeting was concerned.

In view of the common interests and objectives, IWRB readily agreed that one meeting only should be planned for 1967, more specialised consideration of wildfowl management problems being postponed for a future occasion. IWRB together with ICBP joined with the Ecology Commission in sponsoring a Technical Meeting in Turkey. An approach was accordingly made to the Government of the Turkish Republic, which generously offered to act as host and provide facilities for the Meeting, detailed arrangements being entrusted to the Turkish Association for the Conservation of Nature and Natural Resources.

The Meeting was attended by forty participants and seven observers, including eighteen nationals of the host country. In addition to the three sponsoring bodies, the Food and Agriculture Organization of the United Nations, the International Biological Programme, the Council of Europe and the Wildfowl Trust were officially represented. Twenty-nine papers were specially contributed for the Meeting and reprints of a further seven publications were tabled, as a basis for discussion. To the authors, publishers, participants and all those who contributed to the success of the Meeting the debt of IUCN's Commission on Ecology is gratefully acknowledged.

16 February 1968

Hugh. F.I. Elliott
Secretary, Commission on Ecology.

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OPENING SESSION

Monday 9 October 1967 : Ankara.

The Chair was taken by Dr. L. Hoffmann, Vice-President of the International Union for Conservation of Nature and Natural Resources.

Message from President Cevdet Sunay

A message of welcome from the President of the Turkish Republic was read and warmly applauded.

Address by the Minister of Agriculture.

The Chairman asked His Excellency Mr. Bahri Dağdaş, Minister of Agriculture, to inaugurate the Meeting.

After expressing thanks on behalf of the Turkish Government to the three international sponsoring organisations and to the Turkish Association for the Conservation of Natural Resources for arranging and organising the Meeting in Turkey, the Minister said that the problems which would be discussed at the Meeting were of an international character and their discussion was of value and interest to every country now endeavouring to utilise natural resources without jeopardising their existence.

He stressed that in Turkey, where, due to destruction of natural vegetation and particularly of forests, arid conditions were widespread, the significance from an agricultural point of view of conserving lakes and similar water bodies was fully recognised : drainage was only considered where swamps constituted a health or environmental hazard. The importance of such waters from the nature conservation viewpoint, especially as habitat for local and migratory birds, was also undoubted and he wished the Meeting every success in helping towards a clear understanding of this aspect of conservation.

The Chairman thanked the Minister for opening the hearing and for the important points to which he had drawn attention.

Address by Professor Kemal Kurdaş

The Chairman called on Professor Kemal Kurdaş, President of the Middle-East Technical University of Ankara and Vice-President of the Turkish Association for the Conservation of Natural Resources.

Reviewing the long history of human despoliation of natural resources, with special reference to the erosion of the soil, which was a major threat to man's well-being, Professor Kemal Kurdaş. cited the particular case of Anatolia. Excavations at Çatalhöyük, near Konya, had shown that it was between 7000 and 6000 B.C. that, in this region, nomadism gave way to a more sedentary life based on agriculture. Thus for some 9000 years the soil of Anatolia had been subjected to ignorant exploitation, aggravated by wars and migrations. Only quite recently had the harm done to the soil begun to be fully appreciated in Turkey and the creation of the Turkish Association for the Conservation of Natural Resources was the first example of an organised effort to deal with the problem.

The special significance of the present meeting was that such efforts could be seen in their proper perspective, in relation to the fact that steps are now being taken to conserve natural resources through international co-operation. It was, therefore, an opportune moment to appeal again to the people of Turkey to protect the soil and the life it supports. Existing National Parks in the seven provinces of the country and the establishment of many more such parks could play an important part and had the full support of the Association, but basically it was a problem of education. Every means of mass communication must be used and courses should be introduced into the schools, in order to convince people of their duty as citizens to protect their natural heritage. It was for these reasons that, on behalf of the National Scientific Consultative Board, he was so glad to welcome the participants and grateful to the organisers of the Meeting, which he hoped would be very successful.

Replies on behalf of sponsoring organisations

The Chairman, Dr. L. Hoffmann, in his dual capacity as Vice-President of IUCN and Director of the International wildfowl Research Bureau (IWRB), welcomed the participants on behalf of these two sponsoring organisations. He reminded the Meeting of the ever closer relationships between all international bodies concerned with conservation : thus, IUCN was in consultative status with the united Nations Economic and Social Council and with the U.N. Agencies, U.N.E.S.C.O. and F.A.O.; IUCN, IWRB and the International Council for Bird Preservation (ICBP) all co-operated closely with the world wild-life Fund, from which they received a large measure of material support.

Dr. Hoffmann concluded by referring to the vital importance of the host country, Turkey, and of the Middle East generally in relation to the main theme of the Meeting, conservation of wetland habitats including their wildfowl resources. The same point was emphasised in a message from Professor S. Billon Ripley, President of ICBP, the third sponsoring organization, which was presented by Miss P. Barclay-Smith, Secretary of ICBP. Turkey held a key position not only because of the richness of its own avifauna but also because of its international responsibilities for populations of migratory species of high interest and vulnerability, which pass through the country every year. Miss Barclay-Smith went on to describe ICBP's organisational structure and expressed the hope that Turkey and other countries of the region, which had not yet done so, would soon be able to set up national Sections.

Replies on behalf of participating international organisations.

A message on behalf of the Food and Agriculture Organisation of the united Nations was presented by Professor A. de Vos, who mentioned a number of recent F.A.O. initiatives in the region and drew special attention to the importance of a regional approach to conservation problems, so as to make the best possible use of the manpower and material resources available. Professor H. Löffler spoke for the International Biological Programme, which had recently entered into the operational phase of research into the biological basis of productivity and human welfare. The studies of particular interest to the Programme were those which can benefit from international collaboration and which are urgent because of increasingly rapid changes in all environments throughout

the world, so that the subject-matter of the present Meeting was very relevant. Finally, Mr. D.W.P. Lewis, for the Council of Europe, reminded the Meeting that the conservation problems of Turkey, as a member country, were of great concern to the Council which, in close co-operation with IUCN and other international organisations in this field, was steadily developing its conservation activities and projects, Among several which he mentioned, one of particular relevance to the Meeting was the technical assistance now being given in the development of the Lake Manyas Bird Sanctuary National Park.

Address by Mr. Hasan Asmaz

The Chairman called on Mr. Hasan Asmaz, President of the Turkish Association for the Conservation of Natural Resources to bring the session to a close.

After thanking all those who had spoken, Mr. Hasan Asmaz outlined the significance of rational exploitation of natural resources, especially in a developing country such as Turkey, During the present century the roles of science and technology in the utilisation of resources in a manner which would ensure the advancement of the economic welfare of a nation without destroying its resources in the process - a fundamental condition for the greatness of any country -, had become increasingly clear. Destruction of resources nevertheless still continued, though it might vary with the level of economic and social prosperity. Certainly from the point of view of nature conservation its prevention was to a great extent a cultural problem, although many other problems such as population growth and the need for more food had to be taken into account.

In Turkey the problem centred on soil erosion and, because of this, his Association attached special importance to promoting wise use of natural resources closely inter-related with agriculture, which occupied the most important place in the national economy. Nevertheless it recognized that conservation of natural lakes and wetlands was an important aspect in the development of rational exploitation of resources and it would do all in its power to implement the recommendations of the Meeting.

Mr. Hasan Asmaz then outlined, for the benefit of those who were not familiar with them, the history and aims of the three international organisations which had sponsored the Meeting. He concluded by thanking the Ministries of the Government and the Ministry of Agriculture in particular, together with the Universities at Ankara and Istanbul, for their support and all the facilities they had made available for the Meeting.

The Chairman then declared the Session closed.

It is estimated that an additional 3.3 million ha. could be brought under cultivation by taking suitable land improvement measures, and that 9.4 million ha. are non-arable and should be kept under plant-cover as pasture.

B. Water

Annual precipitation ranges from 250 mm. to 2,500 mm., the average being 670 mm. This corresponds to 518,000 billion (million million) cu. metres of water of which the estimated run-off is 167,000 billion cu. metres. The average run-off/precipitation coefficient is 0.32, ranging from a minimum of 0.12 on the Konya watershed, the driest area, to 0.53 on the Antalya watershed, the wettest. Underground water reserves are estimated to be capable of safely yielding 2.5 billion cu. metres annually.

It is impossible for the whole of the annual run-off of 167 billion cu. metres to be used for economic and other reasons. The run-off coefficient varies from one part of the country to another, so that to make full use of it the water would also have to be transferred, on a scale which is at present quite uneconomic. Again, if all the waters of streams and rivers were used, many fisheries, water-transport, canal and drainage systems would be made impossible. Taking these factors into account, inventories of 26 watersheds have shown that only about 80 billion cu. metres of water of run-off are in fact at present economically utilisable.

The water resource, due to topography and continental climatic conditions resulting in intense precipitation and peak run-off, is liable to upset the natural balance. Thus in the period 1955-1964, 387 people were drowned and TL. 375 million-worth of damage was caused by floods : the average annual cost of flood damage is T.L. 40 million and the average area flooded is about 80,000 ha. and the real figures may be higher since many areas have not yet been fully assessed. The damage caused to roads and adjacent farm-land by flooding of road drainage ditches is one important factor.

C. Plant cover.

The total forest area in Turkey is 10.5 ha., but 70% of this forest is not dense enough to check erosion effectively. Grassland areas have been reduced by cultivation and, due to overgrazing, 90% of their natural vegetation has no value as pasture.

Soil Conservation Problems in Turkey

These may be grouped under seven headings, which are inter-related and many or all of which may affect a particular piece of land :

A. Soil Fertility

The main causes of loss of fertility, which has resulted from misuse or over-use for many years, are -

1. Loss of nutrients, about a million tons a year being taken out of the soil and not returned. Half this loss, together with an annual loss of 450 million tons of soil is due to forest destruction, over-grazing and conversion of grassland to cultivation.

2. Loss of water-holding capacity and micro-organisms due to failure to use organic fertilisers and apply agricultural and live-stock residues.

This process is aggravated by uneven distribution of rainfall and soil structure, lack of the best and most suitable kinds of seed and the generally low level of technical knowledge and financial resources among farmers.

To rectify the situation would need -

1. The return to the soil of the annual output of 120 million tons of manure of which at present 67 million tons are burnt as fuel;
2. The application of 8 million tons of artificial fertiliser as against the present level of 1.2 million tons;
3. Retention of plant and livestock residues, backed by the necessary soil conservation measures, including proper crop rotation and improved technical methods.

B. Organic Composition

In addition to the failure to return plant residues to the soil, the position is made worse by the fact that much of the country is arid or semi-arid resulting in greater loss of organic material through decomposition. Studies by the Eskişehir Agricultural Research Institute show that organic materials in the soils of Central Anatolia have been lost at a rate of 25%. of which only a quarter has been replaced by the use of a five-year clover rotation.

C. Structure.

Research has shown that although organic materials have the most important role in maintaining a good soil structure, the fact that, except in the Eastern Black Sea region, the soils are mainly calcareous has assisted and ploughing has prevented much deterioration. However, in alluvial plains, especially in the Çukurova and Aegean regions, soil structure has deteriorated through the use of heavy machinery affecting drainage, while in Central Anatolia deterioration has been due to disc-harrowing, combined with lack of organic materials, which has increased erosion. In saline and alkaline land and in the Eastern Black Sea region, with its lack of lime and excessive use of ammonium sulphate, damage to soil structure is also more liable to occur.

D. Erosion

The serious effects of erosion can be seen in almost every part of Turkey, bare hills with bedrock exposed, gullies and, in low-lying areas, rock, gravel and silt layers. The effects may not be so apparent in cultivated areas, but there is nevertheless an insidious erosion of thin layers of top soil. Gullies can be found in grassland, where erosion is advanced, and in many grasslands on slopes which have been brought under cultivation in the last 15 years, bedrock can often be noticed.

80% of the water erosion is caused by heavy rain, but in arid regions such as those of Central Anatolia wind erosion, aggravated by faulty farming techniques, is increasing. The largest area affected is

100,000 ha. around Karapınar in the Konya closed watershed.

Human factors and natural or technical factors are the two main causes of erosion. The rise and fall of civilisations is closely connected with success or otherwise in using water, soil and plant resources and in Turkey, with the population increasing at 3% per annum and 68% of it engaged in the agricultural sector, the human factor is still the main problem. Many basic measures have to be implemented before a reasonable level of normal and continuous utilisation of the soil is assured, not least in connection with the control of livestock, which is part of the human factor : at present 75 million head of domestic animals are preventing the growth of adequate plant cover by over-grazing and making it impossible to secure a balance of soil, water and plant resources.

The erosion situation can be summed up in the following analysis of the 25.4 million hectares now under cultivation (more than twice the area cultivated in 1945) and much of it due to extension of cultivation to steep slopes or the clearing of forests and grassland :

<u>Million hectares</u>	<u>Degree of erosion</u>	<u>Explanation</u>
7	Nil or very little	Top soil loss 0-25%.
6	Medium	25-50% top soil loss
4	Severe	50-100% top soil loss.
8	Extreme	All surface soil lost - Subsoil variably affected, in some cases bedrock exposed.

Thus, about half the arable land is subject to severe or extreme erosion. Meanwhile, grasslands during the last 15 years have been reduced by a quarter to 29 million hectares, although the number of livestock has increased by a quarter, so that grazing pressure has risen by 50%. This too has accelerated erosion, so that now some 9 million hectares of grassland have reached the severe or extreme stage. No time should be lost in safeguarding the remaining 20 million hectares.

Among the many natural and technical factors resulting in erosion, the following may be mentioned.

1. Topography. Some 82% of Turkey has slopes of over 8% and in 45% of the country the slope exceeds 40%. Contour cultivation is inadequate to stop erosion on slopes of over 8% which are more than about 100 metres in length. Effective measures, such as terracing, are seldom applied, though steep slopes are often used for grazing and cultivation.
2. Effect of low fertility. Infertile soils, lacking organic matter, produce poor crops, resulting in poor stubbles, which do not hold the soil and are also grazed, so that no humus is returned to the soil and the process is cumulative.

3. Inefficient techniques, e.g. downhill ploughing (sometimes the result of small farms fragmented under the inheritance law) and use of implements which crumble the soil, instead of the wedge-shaped type, minimum tillage and chemical weed-killers better suited to arid conditions.

4. Fallows. Under the normal system land is left fallow alternate years and, without control measures, this makes it more liable to wind and water erosion. In areas where average rainfall only reaches 500 mm. the fallow period can be reduced.

5. Climate. Farming systems are not properly adapted to climatic conditions. Turkey normally has a winter rainfall and in some regions temperature is high enough for growth, but the land is left uncultivated, bare and subject to erosion. Much more use could be made of cover crops, including grass and legumes to improve soil quality, during this period.

6. Overgrazing. This is accentuated by the fact that pastures are communal and grazing uncontrolled, as well as being allowed on steep slopes.

7. Forest cover. Flooding and the deposit of debris result from the lack of protection forest. An adequate programme to rectify this situation would require an annual investment of T.L. 500 million over a 100-year period.

E. Drainage.

Problems chiefly occur in the 2 million hectares of saline or waterlogging alluvial lands, which could be reclaimed and made fertile. The productivity of pastures with a high water table is also capable of being greatly improved.

F. Drought.

Except in the Black Sea region where rainfall is well-distributed, the lack of rain during most of the year (though the length of drought varies) presents a soil conservation problem. Irrigation can be used in the areas affected, but the total irrigable area does not exceed 5 million hectares. Drought effects are made worse by loss of water-storage capacity in soils, increasingly shallow soil profiles due to erosion and consequentially greater run-off.

G. Stoniness

Although villagers are constantly removing stones from their fields, more are always being brought to the surface as the soil is washed away. The process can only be checked by anti-erosion measures, such as contour cultivation, which in course of time have a terracing effect.

Soil Conservation Work in Turkey

The responsibility is divided between the TOPRAKSU (Soil Conservation and Farm Irrigation), DSI (water development) and

Forestry Directorates. TOPRAKSU undertakes erosion control, reclamation and drainage, DSI covers watershed flood control and stream-bank protection and improvement, and the Forestry Directorate is in charge of soil conservation, range improvement and afforestation in upstream catchments. It is now a commonly accepted principle that control must start where the rain falls.

The first conservation work began in 1956/57, was placed on a more systematic basis by TOPRAKSU in 1960, and was developed as a national programme in 1963 in the first 5-Year Plan, when TL. 115 million was allocated to the work. This is to be increased to an appropriation of TL. 9,186 million (a thousand million dollars) for soil and water resources development in the second 5-Year Plan, but is still below the level which is really required, since a TL. 800 million a year investment is needed for cultivated and pasture areas alone for the next hundred years. One difficulty which still has to be overcome is that of implementing conservation practices as holdings become more fragmented : land consolidation and farming organisations are the answer and, in fact, very necessary.

CONSERVATION OF NATURAL RESOURCES :

THE EXAMPLE OF FOREST MANAGEMENT IN TURKEY

by

Nurettin Türköz

A country's prosperity depends on its natural resources and the wise utilisation of these resources by individuals. The first need is to understand the nature of the resource to be used. In some cases such as minerals and oil, the main consideration is to adjust consumption to an economic period, but in others it is to limit consumption in such a way as to ensure the perpetuation of the resource, since utilisation depends on its continued existence. Forests are in the latter category or in other words are a natural resource that can produce perpetual energy. Their productivity can be increased by development and improvement of quality and they have the additional advantage of being able to give protection to other resources, by regulating water, preventing soil erosion and floods and, indeed, providing health as well as livelihood for human beings.

Forest-land in Turkey covers 10.5 million hectares, of which, on the basis of utilisation, 48% can be classified as coppice and 52% as used for fire-wood only. But only half the coppice and a third of the fire-wood forests are effective, the remainder being of low quality owing to the way they have been used rather than to any unfavourable climatic or environmental factors.

Because of its geopolitical situation, Turkey has always been the home of many races, the scene of wars and mass migrations. Civilisation starts with agriculture and, in Anatolia, this agriculture began on land suitable for the purpose, but later, in the bid to increase production, spread to areas which should have been left as forest or pasture. The inhabitants of Anatolia have always depended on agriculture and animal husbandry and, even today, the great majority are farmers and because, in a developing country, industrialisation is not yet fully realised, their demand on land increases as population increases. But suitable land for agriculture, especially in mountainous areas where most of the land is under grassland or forest, is limited. Yet it is precisely here, because of the failure to achieve technological progress, that the demand is most acute, so that more and more forests and pastures are destroyed. As a result, soil erosion in the upper catchments and floods in lower areas bring about losses which are greater than the gains.

Another aspect of the situation is the grazing of domestic livestock and particularly goats in forest areas. Because grassland has been taken over for agriculture and because forest cannot provide as good pasture as grassland, there has been a drop in animal productivity. To correct this the wrong method has been adopted, namely to increase the number of animals, and the vicious circle thus created has accelerated the deterioration both of the livestock and of other natural resources.

In spite of technological advances in construction materials and fuel, wood continues to be used extensively for these purposes in the smaller towns and villages of Turkey, where most people live. In theory the growing demand cannot be met from forests which have not been conserved, improved or intensively managed, but in fact the demand still

is met, which shows that the forests are being subjected to excessive exploitation.

These then are the problems which the Turkish forester has been charged by the State with the task of resolving. Much has been done, especially in the last two or three decades, and not only the methods but also laws and regulations have been reorganised and brought up to date. But the real difficulty stems from the socio-economic structure of those who live in or near forest-land and whose livelihood depends upon it. The General Directorate of Forestry is not in the possession of the fundamental means and authority to help solve the social and economic problems. Hence it is still impossible to prevent the destruction of forests, pastures and soils in the upper part of each watershed or the consequent disruption of natural resources in the watershed as a whole.

The basic aim of a planned economy is to remove regional imbalance, so one of the more important answers to these problems is for the State to make more funds available through the forestry organisation for work in the upper and steeper parts of the watersheds, where all the water sources of the country originate. The cheapest way to regulate the rise and fall of water supplies arising out of normal rainfall fluctuations, is to maintain the balance between vegetation, soil and water in the upper basins, which means, in particular, maintaining the grass-land/forest cover. If it is lost, the process of erosion starts and is followed by the usual chain of reactions, which leads to flooding, misery and loss.

Since the beginning of history security and water availability have been the two most important factors determining the location of human settlements. Forest destruction and the degradation of pastures within forest areas through haphazard use, threaten one of these fundamental needs - water. A start has been made in Turkey to reverse the trend, conserve what remains and as far as possible extend and improve the forest resource. Afforestation, for example, which in the decade 1946-1957 had covered only 45,000 ha., had built up to 228,000 ha. by 1966 and is planned in the second 5-Year Plan to take in a further 194,540 ha.

As already indicated none of the forests in Turkey are in their original state, settlements have penetrated the remotest part. The 10 million people living in 9 million hectares explains this and the fact is that the destruction of forests is the work of the people who reside either within or near the forests. It would be wrong to think that this destruction can be stopped, at least in such a way as to normalise relations between people and forest authorities, without meeting all the needs of this great concentration of people. At present with the means at its disposal the Forestry Directorate cannot do this, and it is essential that the fact that the country's prosperity originates in natural resources be reflected by adequate provision for the conservation and development of these resources. Certainly it is impossible to conserve and develop the forests through the efforts of a handful of scientists or of any institution approaching the problem unilaterally.

THE THEORY AND PRACTICE OF CONSERVATION

by

Dr. J.B. Cragg

Conservation is essentially a practical subject. It is concerned with the maintenance of natural systems and, where possible, with their utilisation, either directly or by way of information obtained from their study, for the long-term benefits of mankind. The subject is so practical that I wondered whether it was possible to provide a theoretical background which would not be hidden under a mass of value-judgments. Yet, if a subject is to grow in an organised way, and if it is to provide a thorough basis for the emergence of new concepts and new practices, then there must be interplay between practice and theory.

It was J.M. Keynes in his "General Theory of Employment, Interest and Money" who wrote, "The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood . . . Practical men who believe themselves to be exempt from intellectual influences are usually the slaves of some defunct economist. Madmen in authority who hear voices in the air are distilling their frenzy from some academic scribbler of a few years back."

These words were meant for economists but they apply equally well to the economy of the natural world and to the very large portions of that natural world where man is interfering on an ever-increasing scale. If we are in search of theoretical concepts on which to base the art of science of conservation then it is the role of the scientist to produce generalisations which will allow predictions to be made and which will become "the voices" of those in authority.

Much of our wrong thinking about the natural world stems from theoretical concepts woven into our subconscious minds. To modify Keynes¹ words : we, the people of the world and certainly those of us under the influence of western culture, are the slaves of defunct ideas, ideas which have, in a sense, separated man from other creatures on the planet ; and western ecologists have, for too many decades, accepted, no doubt unknowingly, the creed that man is something outside of the systems which they study.

The Role of Environmental Biology.

For my part, I think that the theoretical background for conservation will come from a vast expansion of our knowledge of what is best described as environmental biology. Some of you may have expected me to say ecology but I am purposely avoiding that term not because, as some people would have us believe, it is some kind of "soft" science, but because there are many aspects of the relationship between organisms and their environments which are not wholly ecological.

The practice of conservation demands more than the content of ecology. There are some who argue that any type of ecological study should be looked upon as a possible source of material for the build up of the theoretical framework for conservation. There is a danger in

this kind of thinking or, expressed in modern parlance, non-thinking. The mere accumulation of facts has never been a particularly inspiring or even productive way of advancing our understanding of natural phenomena. Ecology has suffered from its large quota of fact-finders who have had to excuse their desire to spend days in the open-air by making a duty of it.

Only now is the experimental approach being used with great effect in ecological sciences, even though the basis for this approach was well established over one hundred years ago by developments in scientific agriculture, with Leibig in Germany and Laws and Gilbert in England among the pioneers.

Environmental biology, and in particular environmental physiology, has much to offer the conservationist. A knowledge of an organism's sensory physiology, its nutritional requirements as distinct from its food preferences, are examples of the type of information which can help to solve certain conservation problems. Again, the reactions of a plant to over-cropping or over-grazing have a basic chemistry not normally considered as part of the contents of ecology. There can be little doubt that an increased knowledge of specific sex attractants or repellents and the development of chemical sterilants will come to form part of the conservationist's factual background. These are only a few of the examples of the kinds of information which should come to form the tools of the working conservationist.

It is, of course, important that the environmental biologist is every now and then brought into close contact with those people who are concerned with actual conservation problems in the field. I can illustrate this point by reference to the Arabian oryx, an animal of special importance to IUCN and to all people interested in saving species on the verge of extinction. A breeding colony numbering sixteen animals now exists in the Zoo at Phoenix, Arizona, a result of the efforts of a number of individuals and organisations under the leadership of the Fauna Preservation Society. The World Wildlife Fund played an important role in this species-rescue operation.

Last January I was able to see this colony of Arabian oryx thriving in an area of the world thousands of miles from its normal range of distribution.

If you look at the data which were collected in connection with this move, you will see that the operation proceeded on slender ecological information. Its basis did not lie in the careful selection of ecological facts but on a general knowledge of the geography and climate of Arizona which, in broad terms, is similar to that of those parts of Arabia where the oryx occurs naturally. The animals are being fed, not as a result of a careful study of their wild food habits, but on the basis of empirical management practices which have slowly evolved in zoological gardens throughout the world. The ecologist consulted about saving the oryx would no doubt have said, "well, we haven't got enough facts as yet". The wildlife managers, as is so often the case, had to operate on a judicious mixture of common sense and empirical knowledge.

Need to expand Environmental Biology

It was R.G. Collingwood who drew an analogy between the growth

of science and that of an organism, that the units within science were the facts and it was not so much the discovery of new facts which altered the form of science but a realignment and reorganisation of knowledge. In looking for the theory of conservation we should be asking ourselves who is going to stir up the factual broth to give birth to new orientations? There is no ready answer because such "stirrings up" come unexpectedly, although, if environmental biology or its sub-unit ecology were as well-organised as nuclear physics, then one would be able to forecast the likely places where radical changes in thinking might occur. One of our troubles today in conservation is that we do not have a sufficient concentration of environmental biologists in one place to bring about the catalysis of effort which has characterised the growth of modern physics and, in more recent times, the achievements of molecular biology.

There are some concentrations but, for the most part, they are in government or government-linked laboratories more or less closed to the next generation of students during those formative years when student-staff contacts can have a major catalytic effect. Short periods spent by students in research laboratories can be very useful but I believe, having had considerable opportunities to experience both types of institutions, that in the majority of cases it is within the atmosphere of a university that future generations of conservation scientists should receive their greatest stimulus.

I said "should receive" because it is quite obvious, when we glance at opportunities for such contacts in the world today, that they are few in number. In many biological departments for example, one person may be expected to deal with the whole complexity of plant-environment relations, whereas the bits and pieces of plants may occupy the attentions of quite a large number of people. This is a state of affairs which will have to be altered if conservation is to rest on a broad scientific basis.

Towards a Theoretical Ecology

There are aspects of conservation, certainly those which rest on ecological interpretations, which are amenable to theoretical investigation. D'Arcy Thompson was issuing both a challenge and a forecast to biologists when he wrote, "I know that in the study of material things, number order and position are the threefold clues to exact knowledge: that these three, in the mathematicians' hands, furnish the first outlines for a sketch of the Universe."

From the standpoint of conservation, there is need for a theoretical ecology and, with computers, the theory should not suffer from the over-simplifications which have been offered in the past. Although those simplifications have given shape to much ecological thinking, particularly about populations and competition, they have emphasised the need for a greater degree of collaboration between mathematician and biologist.

In manipulating the environment and in attempting to conserve natural resources, we are interfering, often in a clumsy way, with what are highly complex, integrated systems. These systems have remarkable capacities for self-adjustment. They are sufficiently well ordered to reproduce themselves over long periods of time until disruptive forces bring about irreversible changes.

Fundamentally, the scientific problems which face the ecologist and conservationist are those facing all scientists studying living systems of any kind, whether the system be a single cell, a grasshopper, a mammal, or a complex ecosystem such as a woodland or a marsh. The underlying processes on which the operations depend are fundamentally similar, differing only in their magnitude.

One tool, both for the formation of theory and for the solution of practical problems, is the development of systems analysis in relation to conservation. Biologists have always been prepared to accept major gaps in their knowledge and to skirt over them. The development of knowledge of the cell, the growth of ideas about mechanisms of integration within whole organisms, the emergence of concepts of homeostasis at organism and then at community and ecosystem levels, would today be described as examples of systems thinking, but the detailed applications and analyses of such approaches to conservation problems have yet to come. It is high time that the ecologist came round to thinking in terms of energy and accepting the importance of words written by Boltzmann nearly a hundred years ago when he said that "the available energy is the main object at stake in the struggle for existence and the evolution of the world." What are the fundamental features of natural systems? How is energy transferred and utilised? How are chemicals circulated between the environment, the plants and the animals in different habitats? How efficient are these systems? Applying systems theory, what happens when different energy pathways are blocked or modified? Finally, what lessons can be learned from their study to highlight or improve methods of food gathering, methods of protecting our landscapes from erosion, or of ensuring that there is wilderness and natural things in plenty for the generations yet to come?

The Nature of Man

Many of us when we entered the world of conservation tended to have certain illusions. We were schooled in science and believed that the problems of conservation were scientific and lent themselves to scientific solutions. We soon learned that this was not the case. Conservation is not a single field of endeavour, it is highly complex, ranging, as so many problems of the natural world range, over the whole gamut of men's activities and feelings. At one end there are basic scientific problems, perhaps the easiest and most clearly defined part of the conservation network. Then you slip into the grey worlds of management, economics, social and political impacts - both at the national and international levels. As if that were not enough, there are moral problems for, as we all know, attitudes to the natural world are dependent to a large extent on religious beliefs, even where belief and action are not always in line.

It is perhaps the awareness of these difficulties and the fact that too many of us have been trained to look at problems in a special and limited way that makes us fight shy of tackling the theory of conservation.

In our search for both theory and practice, we must remember that, in seeking a solution for the obvious, we may be concentrating our energies in the wrong pathways. Imagine us living in the days before Pasteur had developed the germ theory of disease. How much money would

have been expended by governments and other research agencies on investigations concerned with the nature of pus or blood poisoning? How many doctorates would have been won by superficial and irrelevant studies?

It is not enough to study nature, we must have greater knowledge about the relations of man with the natural world during the growth of civilisations. This growth has culminated, partly through the population explosion but mainly through the technological revolution, in man engulfing the other organisms which form part of the same natural systems. We must understand man and if need be, attempt to modify his cultural and social habits to produce a new relationship with living things.

I am not alone in thinking that man himself may require re-modelling. A sentence by Charles Elton in his book on "The Ecology of Invasions by Animals and Plants" bears on this problem. He describes conservation as a "... wise principle of co-existence between man and nature, even if it has to be a modified kind of man and modified kind of nature".

In examining man we should enquire carefully into what I call the cult of wilderness. The reasons for people wanting to have access to the countryside have never been adequately studied. Many believe that man must have access to wilderness to renew his ties with nature and for his mental health. Yet modern industrial man is so wedded to the comforts of his civilisation that he usually expects a mosquito- and snake-free wilderness. In fact, the demands for outdoor recreation, stepped up by many types of advertisement, are one of the major threats to wildlife in many parts of the world. So much so, that in countries with huge areas of real wilderness it can prove difficult for the scientist, as a land-user, to obtain complete control of experimental sites.

An aspect of the wilderness cult is the belief that man must satisfy his primitive need to hunt. In a recently published book, "Eden was no Garden" by Nigel Calder, the plea is made to produce food in food factories "to liberate man from slavery to the soil and release vast areas of the earth's surface for the creation of a natural wilderness to tempt and challenge the hunter that lurks in each of us." Quite frankly I think this is an appalling view to take of the aspirations of mankind. If this is to be a major reason for maintaining wilderness then perhaps the disappearance of wilderness is aiding rather than handicapping men's mental progress. I do not believe that this is the case. But examples of this kind of thinking abound and no doubt, in part, account for the sale of two million guns in the U.S.A. last year. The sooner we look at the possibility of modifying man, or at least some sections of mankind, the better the chances of maintaining a creative approach to the natural world.

I believe there is a myth about wilderness, a cult with its Arch-Priests, a cult associated with the worship of the automobile and the uncontrolled spawning of little boxes, used as houses, across the countryside. I doubt whether there is any real basis for the highly romantic notions which surround this alleged urge to invade wilderness. The conservationist's practical problems would be simplified if people re-read their Thoreau and discovered that his Walden, where he sought solitude, was only two miles from his home village which he regularly visited. Wilderness and crowding are not absolute terms. Their meaning varies with particular cultures and societies. This was brought

home to me in no uncertain fashion when I visited New Zealand a few years ago. Many people said that there were already enough people there. Yet, there were only two and a half million in a land as large as, and with a variety as great in its own way as that of the United Kingdom where there are some 54 million people living. The city of Auckland has some half million people covering an area as large as that of Greater London where there are at least eight million.

The Quality of the Environment

One of the major problems we face in conservation is putting on the price ticket, and anything which will help us to arrive at methods of calculating costs and returns will be of tremendous value.

It is perhaps an impossible task to put a price tag on many of the operations which fall within the sphere of conservation, but the situation is not hopeless. Conservation is one aspect of a wide field of endeavour which is concerned with the maintenance of the natural environment. In fact, because conservation is concerned with an all-embracing approach to the world of living things, conservation organisations should have as one of their major aims the maintenance of the quality of the human environment.

When we talk of quality we can conjure up situations and happenings which do carry price tags and the conquest of pollution falls within this sphere. Pollutants are a major threat to the natural resources whose conservation is the main objective of IUCN, and the aims of the Union are not confined to cultural and scientific values, but include the long-term economic and social welfare of mankind.

The pollution of the environment in North America has been given a price tag by the U.S. President's Scientific Advisory Committee. In its report under the hopeful and inspiring title of "Restoring the Quality of Our Environment" the Committee states : "Pollutants have altered on a global scale the carbon-dioxide content of the air and the lead concentrations in ocean waters and human populations. Pollutants have reduced the productivity of some of our finest agricultural soils and have impaired the quality and the safety of crops raised on others. Pollutants have produced massive mortalities of fishes in rivers, lakes and estuaries and have damaged or destroyed commercial shellfish or shrimp fisheries. Pollutants have reduced valuable populations of pollinating and predatory insects and have appeared in alarming amounts in migratory birds."

The White House Report also drives home the lesson that pollutants disregard political boundaries and that we are dealing with a world problem, no doubt of greatest concern in heavily industrialised countries, but nevertheless of concern to every nation to a greater or lesser extent.

The price tag ? In the U.S.A. the Report quotes 125,000,000 tons a year of solid garbage for urban areas. The collection of this material and its disposal costs some two and a half thousand million dollars. If we want to put these figures into practical everyday terms, they include such items as 48,000,000,000 cans, about 250 per person. Even in Canada, with its population of only 20,000,000 people, it costs

the Federal Government some \$ 50,000,000 a year to remove litter from the highways, streets and cities.

According to the white House Report, the use of lead alkyls in gasoline or petrol, an introduction begun in 1923, has resulted, in the space of less than 25 years, in the addition of about 10 mg. per sq. metre of lead materials to the surface of the Northern Hemisphere. Ordinary pasture grass collected at the intersection of two highways in the U.S. contained three thousand parts per million of lead. The total economic loss to the U.S.A. from the effects of air pollution on crops alone was put in the range of \$ 150,000,000 to \$ 500,000,000 per year. These are hard economic facts which should and must be remembered by conservationists.

There is no need to remind conservationists that in various sporting areas the waters which are shot over contain enough lead to poison various plants and to produce not only toxic symptoms in wild-fowl but lead poisoning in people who include these birds as a regular item of their diet.

Sometimes I wonder whether we are prepared to learn from history. Millions of tons of lead were produced by the Greeks as a by-product of silver refining. Greek and Roman aristocracy used lead-lined cooking, eating and drinking vessels. Lead salts gave a sweet taste to foods and retarded decomposition. Grape syrup was concentrated in lead-lined pots over a slow fire and stirred to give the mixture a sweet taste. And thus it was that lead poisoning, with all its various effects, lassitude, infertility, to mention only two, no doubt contributed to the collapse of the Roman Empire.

Has this story a modern counterpart? It may be true about insecticides and it may well be true of lead itself. Of course, some of the deleterious effects have now been recognised, but what of the others? Lead, insecticides, radioactive fallout are examples of what one might call specialist interferences with the environment. Thus, in building our theory of conservation we have got to remember that the whole system must be examined in order to preserve the quality of the whole environment. This is where the conservationist should lean heavily on a modern ecology, and this is where the conservationist should know that he is fighting a battle which is of importance not only to the natural world which figures so much in his thinking, but to the actual physical survival of mankind.

The International Biological Programme

There is a need for an all-out attack on all matters concerned with the quality of the total environment of man. We are fortunate today in having a flourishing International Biological Programme. In various places throughout the world comprehensive studies are now being made on a variety of problems and out of IBP much of the basic theory of conservation will emerge.

There are two sections of IBP of particular interest to IUCN : the section concerned with the conservation of terrestrial communities, whose major objective is to produce a classification of important habitats, especially unique sites, throughout the world. Whilst many such sites will need complete protection to guarantee the survival of

of rare communities or particular organisms, many will serve as sites for the scientific study of organic production which is not man-managed but reflects the results of countless years of evolution. These production studies are being handled by another section of ISP, under the initials FT, which is concerned with production in terrestrial communities. In various places in the world IBP studies have already passed from the preliminary feasibility stages to fully-manned investigations.

If IBP does nothing more, and this is a pessimistic valuation, it will have encouraged the development of a common language in environmental biology. The development of a common scientific language coupled with the establishment of reproducible standards will be a major step towards integrating and advancing biological knowledge.

The Need for Social Action

The scientist alone is helpless in producing a theory of conservation because conservation is essentially something which must be put into practice, and to put it into practice demands considerable development in the social conscience of many peoples in the world today. I have talked about price tags. It is, I think, interesting to note that less than two months ago the Financial Post, one of Canada's major journals, carried a leader with the heading "Preserve the Marshes". The leader pointed out that in many ways Canada was the envy of the western world because it still retained large areas of unspoiled country. It went on to point out that in many countries it was almost too late to save such areas from urban spread and called for a movement to preserve what they referred to as "Natural Canada". It set out the requirements for effective action in saying "...effective results will need government action at the appropriate levels, backed by public opinion and citizen action. In this, community groups ... can play a great part at the municipal and provincial level ..." In particular, it pleaded for the "preservation of wetlands as wildlife reservoirs". I think this is a sign of the times, and a good sign, when the very people who are used to putting price tags on things can appeal for what, at first sight, are things with only emotional and aesthetic value.

At the Ninth General Assembly of IUCN in Lucerne (July 1966) Dr. Joseph L. Fisher, President of Resources for the Future, of Washington, gave an inspiring address on new perspectives on conservation for the years ahead. He emphasised the need for close links between IUCN and the social sciences. He pointed out that he was a social scientist and some people may well have felt that it was because of his own interest in social science that he felt this need to be important. I am not a social scientist, but having worked in universities, and having worked in the British Nature Conservancy, I am certainly of the opinion that there must be firm links between the environmental biologists on the one hand and the social scientists on the other.

If scientific policies are to be put into action, then they must be understood and their relevance must be appreciated. It is essential, therefore, that any theory of conservation includes concepts provided by the social scientist. For, as Fisher pointed out, "We live in a man-centered world".

In demanding this link with the social scientist, I suppose I am echoing in some ways the thinking of Lewis Mumford. In his refreshing and stimulating address at the Smithsonian celebrations in 1965, Lewis Mumford spoke about "Technics and the Nature of Man". He challenged the generally accepted view that man conquered the environment largely because he was a tool-maker. He pointed out that man's artifacts have played too great an importance in descriptions of his pre-history. To Lewis Mumford, the human brain was the most important tool that man had from his earliest beginnings and he refers to tool-mechanics as no more than a fragment of biotechnics. To him it would seem that the use of tools and the demands of food-gathering, though important, did not consume much of man's time, and that throughout his evolution man had opportunities for creative existence. Much of his mental energy was, in fact, given to cultural and symbolic activities which raised him above the purely animal level. For too long we have held a utilitarian interpretation of man's early history and have not given enough attention to the more creative and emotional aspects of man's being. Modern work on various groups of animals, particularly on primates, is beginning to show that there is an emotional and aesthetic depth in evolution which reaches its maximum development in man. It is for these hidden depths that one should examine very carefully the conservation ethos and by way of education utilise, in a constructive manner for conservation, the cultural powers which reside in man, linking them to the existence of man as part of the natural world.

I have talked about the International Biological Programme. I think it is now time to repeat on the social level, the kind of operation which is now taking place in IBP. At the Lucerne Meeting Dr. Joseph Fisher appealed for an International Conservation Quinquennium. With such a programme, or perhaps independent of it as a programme in itself, there should be studies on an international basis to look at the way in which man in different communities sees his relations with the natural world. It is not enough to say that this has already been done and that the information lies on library shelves throughout the world. There is information there but it is difficult to bring it together in any kind of orderly fashion. Units and methods vary and much of the work is not quantitative. We need international teams of sociologists, biologists, climatologists, geographers and a whole host of others to explain local phenomena in relation to problems of conservation and men's attitude to the natural world. We cannot divorce the study of conservation from the study of economics and religion. Social attitudes matter more in the success of conservation operations than scientific studies. If we neglect them at the present juncture, then so much of what is done in the sphere of environmental biology, on which practical conservation techniques can be based, will be wasted.

Conclusions

The science of conservation must do for the land and waters of this planet what the science of medicine has done for man. At present, conservation is engulfed in the disease aspects of natural systems but, as basic knowledge grows, it must pass as medical science has passed, from a concentration on disease to an emphasis on health. In this case, the health of man's total environment.

Conservation operates under the threat of "Time's Arrow". Evolution is an ever-continuing process. Faunas and floras have disappeared in the past and will continue to disappear. These are events in geological time beyond the control of man. It must be accepted in conservation that the slow changes in ecosystems brought about by natural events are part of those continuing processes which have led to an increase in the diversity of organic forms.

Conservation is not the maintenance of the status quo except in the very special oases of vanishing faunas and floras which should be preserved as records of evolutionary change. It is not for the conservationist to halt all change, a ridiculous hope, but it is the function of the conservationist to examine and pass judgment on man's interference with the world of living things.

We are moving into a stage of technological development when even greater changes may threaten the total environment. At present, attempts to modify weather are on a limited scale but they are being extended. What is good for a farmer, a forester or a resort keeper will not necessarily be good for the existence of specialised ecosystems. It is important that conservationists lift their eyes from the problems of this animal or that plant, to look at those more insidious changes which, by producing major alterations at one point in an ecosystem, could do untold and perhaps irreversible damage.

In seeking our theory of conservation, man must be put back into the economy of nature. Conservation science must re-orientate its thinking to take more notice of man as part of the systems which he influences. Conservation should offer a total, systems, approach, in which results from ecology and other aspects of biological science are integrated with knowledge of man himself. There is need for more knowledge of those cultural and sociological attributes which, for some reason or other, have led man to destroy, rather than maintain, those natural living systems from which, as yet, we have learned so little and from which we have so much to learn.

In concluding my remarks, I would like to take the opportunity of saying a few words about the wildlife potentialities of Turkey, of which I have already had an opportunity of seeing something on visits to the Moğan Gölü and the Tuz Gölü. My first reaction to what I have seen is one of very great optimism. You have, in Turkey, wildlife assets of outstanding quality which have, in a sense, suffered little from the demands of man. Certainly they have not suffered to anything like the extent of many wetlands in other parts of the world. The variety and abundance of the bird life associated with the two wetlands I saw amazed me, and here I felt was something which is of tremendous potential value, not only to Turkey but to the world as a whole.

Throughout the world we are short of baselines against which to measure the effect of man's insults to the natural environment. Here in Turkey you have a great opportunity of providing that baseline information. At the same time, the information which can be gathered from these water bodies should help us to understand how they can be managed for man's use by way of recreation and by way of utilizing the wildlife for food and for aesthetic satisfaction.

From the strictly scientific point of view, one might ask the question : What is the biological productivity of some of these water bodies ? No one knows. Yet, many of these water bodies are an intimate part of man's environment. You have around such water bodies human communities which utilize the water body in a variety of ways and the whole complex, man and the wetland, should be studied.

To make these studies as valuable as possible, I think that a Research Institute, preferably attached to a Turkish or Turkish universities and serving both Turkish and overseas universities, should be set up for an all-out attack on wetland problems and, in particular, stressing the role of wild birds in biological production.

You have the places and the birds and I am sure that scientists will be prepared to come from all parts of the world to work here, to share their technical know-how and, in the process, make major contributions not only to the practice but to the theory of conservation.

PROJECT MAR

Its principles and objectives ; its special significance
for the Near and Middle East Region

by

Dr. L. Hoffmann

In 1961 the International Union for Conservation of Nature and Natural Resources (IUCN) decided, in co-operation with the International Council for Bird Preservation (ICBP) and the International Wildfowl Research Bureau (IWRB), to launch a programme for the conservation and management of 'wetlands'.

Wetlands were defined as all areas of marsh and all stretches of water less than six metres deep, whether fresh or salt, temporary or permanent, static or flowing. More and more evidence had been coming forward from all parts of the world that wetland areas are a type of habitat which is particularly threatened by development, due to their obvious fertility, to the attractions of a plentiful and accessible water-supply especially in areas otherwise subject to periodic drought, and, not least, to the fact that modern technology (earth-moving machinery, chemical treatment of the soil, artificial fertilisers, etc.) has greatly facilitated drainage and other major modification of these areas. Yet natural or slightly modified wetlands support a vast and specialised range of plant and animal life, the full value of which has quite recently begun to be recognised and the optimum utilisation of which is only now beginning to be achieved through proper management in a few pioneer localities.

For these reasons it was felt that the time was opportune for an international project to study and publicise the values of wetland habitats and to promote by every possible means co-ordinated interest and action in their conservation or, in other words, their wise utilisation for the benefit of present and future generations. The title MAE was chosen for the Project because the syllable occurs in many words which denote natural wetland - marsh (English), marais (French), marismas (Spanish) etc.

As I have already mentioned, a change in attitude towards the utilisation of wetland has recently occurred in various parts of the world, particularly in some highly developed countries. Whereas wetlands have for centuries been considered as "wastelands", their numerous actual or potential values are now more and more widely appreciated, for the following reasons :

(a) first, if properly managed, they can often produce significant yields in fish, livestock, wildfowl, fur, timber, reed, rush and various other crops which do not necessitate major alteration of the habitat. Such exploitation can often be effected at a relatively modest cost, whereas drainage would be very expensive and its result unpredictable.

(b) secondly, wetlands frequently play an important part in water control, absorbing water in wet seasons, or when rivers are high or overflowing, and storing it so that it is available in dry periods.

They also undoubtedly have an influence on the water table, although it may not always be easy to recognise and assess and, as a result, drainage of wetlands has been known to impoverish surrounding farmland by depleting subsoil water resources ;

(c) thirdly, wetlands have a specially high scientific interest because of the large number of plant and animal species dependent on them and because of their natural productivity, which is usually rated as one of the highest in any kind of habitat, whether natural or modified. They may therefore serve as scientific laboratories of great importance to improved utilisation of natural resources and they certainly have a high educational value, because nowhere else can a true understanding of our environment, of nature and its laws, be more easily promoted;

(d) last, but not least, wetlands are increasingly used for recreational activities because they offer more diverse opportunities for healthy outdoor recreation than most other kinds of habitat. Sport-fishing, sport-shooting, wildlife photography and observation, sailing and many other aquatic sports, bring millions of people to the wetlands of Europe and North America, so much so that in many areas demand exceeds supply and has led to the creation of artificial wetlands or to migration in search of such areas in distant lands. This form of exploitation may, for the time being, be of more importance in industrialised countries with a high urban population, but there is no doubt that the same needs are developing rapidly elsewhere and that the proper management of wetlands for recreation, in suitable and carefully chosen areas, is capable of yielding a high economic return by attracting local and foreign tourists.

To return now to Project MAR; the first stage was restricted to Europe and north-west Africa and has produced a diversity of documentation and action in support of wetland conservation. Three publications have so far been issued. 'MAR Volume 1' was based on the inaugural conference, held in the famous Camargue wetland in southern France in 1962, and on the large number of papers which were there presented : it contains much useful and detailed information on wetland conservation and management problems and techniques. 'MAR Volume 2' was an annotated list of the wetlands of Europe and North Africa which were judged to be of international importance and deserving a very high conservation priority, with special reference to their function as waterfowl habitat. Thirdly, an illustrated brochure in French and English, 'Ressources méconnues' - 'Liquid Assets', was widely distributed to water and river Boards, local authorities and many other organisations and individuals concerned with land use, in order to explain the principles and aims of wetland conservation. Based on these three publications, further investigations and interventions in support of wetland conservation have been effected in several European countries during the last few years and many of them have met with success and helped to promote better-balanced conservation programmes.

Last year it was decided that the time had come to extend Project MAR to other parts of Africa and to Asia and, especially, to the Near and Middle East. From the international point of view, the Near and Middle East wetlands are particularly important as wintering grounds and migration stations for a large part of the Old World populations of waterfowl such as swans, ducks, geese, waders and herons. Conservation and management of these populations required broad based international

co-ordination, for their breeding grounds stretch from Scandinavia to central Siberia, and their wintering range from the west coast of Africa right through to East Pakistan and possibly Burma. Much can still be done on a piecemeal basis but with the present rate of economic and agricultural development in western Asia, international co-ordination is already needed, if the situation is to be controlled - which is why we are here now.

Most of us are agreed that the first step is to conserve the most important existing wetlands. For this a MAG wetland list on an international basis and recognised by the governments concerned is an essential prerequisite. Only in this way will planners be able to give due weight to the international value of these wetlands, quite apart from the local economic, sociological and other aspects. Further efforts should be directed towards effective management of these listed wetlands, including the improvement of hunting regulations with a view to making the best use of valuable resources. Investigations will be necessary in order to know numbers and distribution of wintering wildfowl, their most important food resources and effects of multiple use such as reed cutting, fisheries, grazing, etc. It will be necessary to study how these investigations can be made by existing or new institutions, perhaps with outside help. Once research has provided the necessary documentation, the highest possible level of sustained yield could be determined and achieved for each country.

Other activities should be directed towards conservation and creation of wildfowl resources within the framework of development schemes. Such schemes are of vital necessity in the whole region in order to meet increasing requirements of agricultural production, for an increasing population, as well as for flood control. Many such schemes have been achieved recently or are under achievement. Many more will be carried out in the near future. The most important single field of action is likely to be in the drainage basin of the Tigris and Euphrates. This lies in Turkey, Syria, Iraq and even Iran. The problems are both staggering and urgent. Throughout the basin there is economic as well as political pressure to increase agricultural production, and as we all know water is the limiting factor, not land. More and more flood water is to be stored and used for irrigation, which leaves less flood spillage which is the main source of supply to the principal wetlands we are considering. Projects are in various stages of preparation or development in all these countries and profound changes are going to take place before our eyes in the next 10 to 30 years. Before this happens there is an urgent need to find out exactly which areas are the most important and why; how new storage and irrigation works can be used or developed to provide a substitute for the wetlands which will disappear; and where the real development priorities lie, so that wetland conservation programmes can be planned now.

When development priorities have to be established, the outlook for the conservation of wetlands may seem hopeless at a first sight. But if one takes a closer look at the problem this is not so. Conservation, in the true sense in which the word is now used, means the wise, rational use of natural resources for the benefit of mankind. Conservationists are therefore, certainly not opposed to development schemes which increase productivity. On the contrary they may well be able to assist such schemes by ensuring that they are designed in such a way as to have a still higher productivity value for the human populations in their vicinity and for the economy of the country as a whole.

Thus one of the principal concerns of the conservationist is to find a proper balance between the short-term and long-term benefits and consequences of development projects. Too often a development project is planned with only immediate short-term yields in mind and quite insufficient attention is paid to the long-term implications, with results which may be disastrous. For example, if the water-level of a lake or marsh is lowered, it may be expected, in the first instance, to provide additional very productive agricultural land. But, unless the long-term effects have been very carefully studied in advance, reclamation may in fact easily result in depletion of subsoil water, progressive desiccation and loss of productivity. In the end productivity may fall well below that of the wetland in its natural state and restoration of productivity to its previous level is always likely to prove extremely difficult. This is what has happened in the Macta marshes in Algeria and no doubt in many other places.

One of the first principles of conservation is that a natural habitat is the result of millennia of evolution, during which the vegetation cover and animal life have tended to reach the maximum productivity attainable under given climatic and edaphic conditions. Where development is under consideration, therefore, it may often be advantageous to plan improved utilisation of the natural habitat or of the habitat as somewhat modified but still of the same general character, rather than to introduce drastic changes. The former procedure is likely to be much less expensive and stability will tend to be ensured by natural factors, whereas drastic alteration of the habitat is not only bound to be costly but its maintenance will be a constant and expensive fight against nature. So, in the case of wetlands, marshes which have reached a late stage of vegetational succession may quite easily be converted into productive wet pasture or woodland, and deeper water areas may similarly be adapted to use for fish-culture and wildfowl, fur and reed production, with a higher over-all economic output than if drained for arable farming.

A further point which should not be forgotten is that development schemes should not be looked at merely from the point of view of economic production, but also as a contribution to the environment in which people live. A pleasant environment is not a luxury but is something which human beings need and which stimulates and assists their productive capacity. It also covers aesthetic values and opportunities for outdoor recreation, and both of these should be taken into account in planning development. Proper management of water resources is one of the most satisfactory ways of bringing about these improved environmental conditions.

Special mention may also be made of reclamation schemes in river deltas on the sea-coast. In arid regions this type of habitat is often characterised by a belt of salt steppe and brackish lagoons close to the sea and, being nearly at sea-level, the subsoil usually has a high salt content. Reclamation of such land is technically difficult and very expensive, while the yield which can be expected is comparatively poor. In principle therefore, such areas are usually suitable for management as brackish wetlands, which in addition to their capacity for sustaining productive fisheries, are particularly well-adapted for supporting large numbers of wildfowl and waders, a natural resource which apart from its intrinsic scientific, educational and recreational interest, can have considerable economic importance if wisely used.

All these considerations point to the fact that in the region with which we are concerned at this Meeting it is important, perhaps more important than in many other parts of the world, to make sure that the most economic multi-purpose use of water-resources is always regarded as an essential aim of development planning. For example, I would like to recommend for your consideration that river-valley development projects should include provision for the conservation of wetlands or the creation of new wetland areas. As I have tried to show, the benefits which could accrue are manifold. They would include water storage for irrigation, industrial and domestic use; control of the subsoil water-table; flood control; the production of various natural crops such as fish, livestock, wildfowl, fur, timber, reed and rush; recreational uses such as sailing, swimming, sport-hunting and sport-fishing; improvement of the landscape and the environment in which men live; education in the biological sciences and conservation of material for scientific research. It follows that if development with all these objectives in mind is to be carried out successfully, it should always be planned in consultation with ecologists. It also follows that what has been called the zoning principle, the careful allocation of different sectors of a wetland to different purposes, will be an essential part of the plans, if the successful co-existence of the various forms of utilisation and the various benefits to the human population are to be achieved. In fact in most cases, the fullest possible investigations, carried out in co-operation by civil engineers, ecologists and economists, are always necessary for the planning of sound multi-purpose development schemes.

Finally, this introduction to the principles and aims of Project MAE and of its extension to the region would be incomplete if I did not make some reference to certain problems of human health. In the past, wetlands were always looked at as sources of sickness and this was often one of the main reasons for draining them. Today the situation has altered. It has become much less expensive to control and ultimately eliminate malaria by medical means, perhaps aided by chemical applications rather than by drainage, and the same is true for several other diseases. Probably the control of bilharzia remains one of the few rather intractable problems and it is difficult to oppose drainage where this still seems necessary in the fight against this disease. Fortunately, however, bilharzia occurs only in rather few places in the Near and Middle East region and, moreover, effective drugs are now under development which give grounds for hoping that therapeutic treatment will soon be less expensive than drainage of wetlands to eliminate the disease-carrying snails and certainly less wasteful of one of mankind's most valuable resources.

FIRST TECHNICAL SESSION

Tuesday 10 October 1967 : Ankara

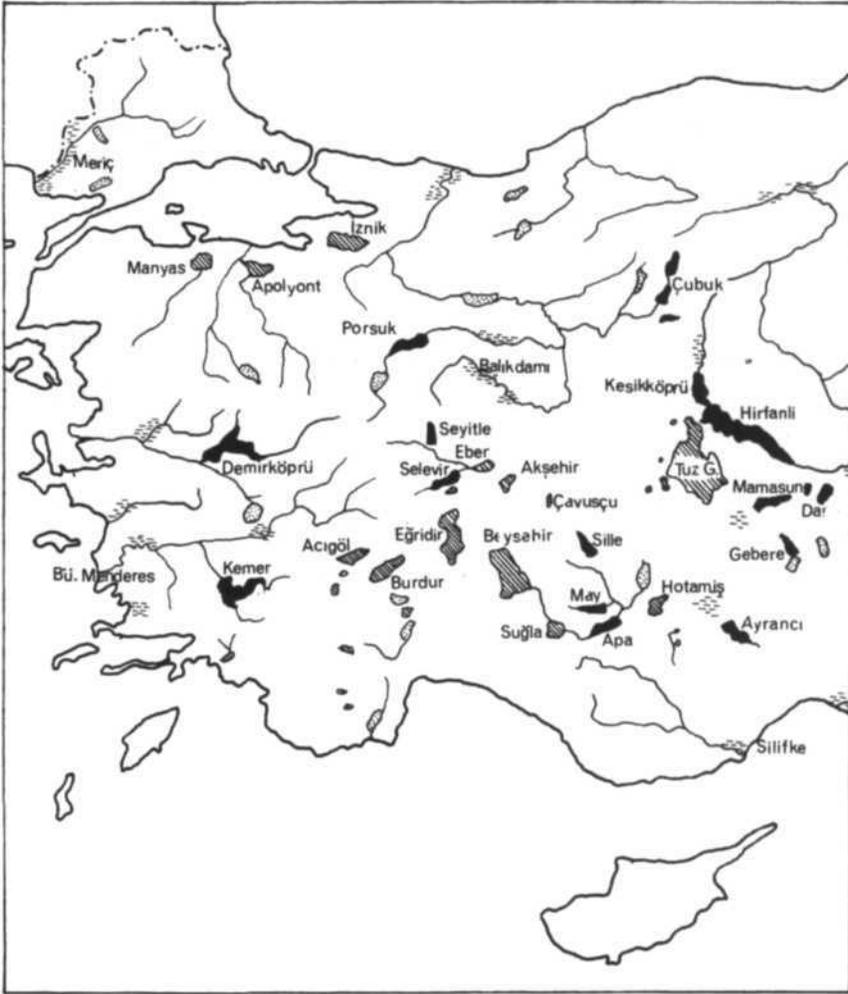
Agenda Item 1. : The Turkish wetland situation, as an illustration of the conservation problems of the wetland areas in the Region, with special reference to development and management.

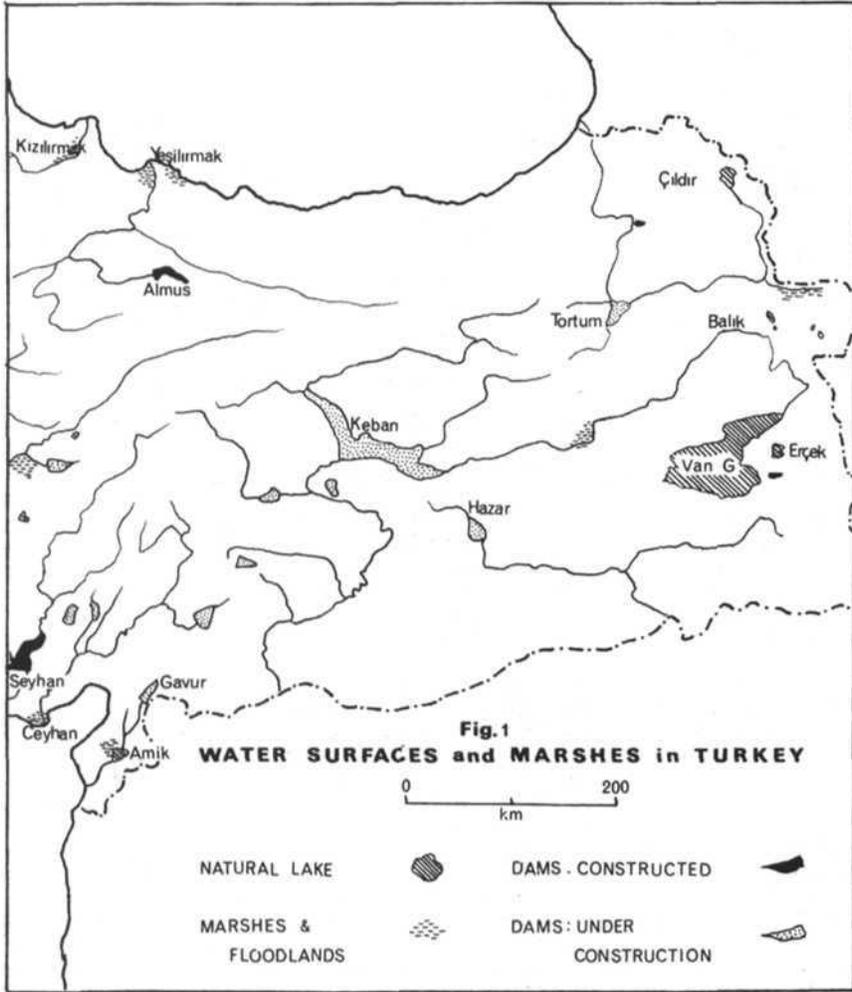
For the Technical Sessions the Chair was taken by Dr. J.B. Cragg, Deputy Chairman of IUCN's Commission on Ecology.

Twelve Papers were contributed for this Session, ten of the contributors being present at the Meeting. They were called on by the Chairman to present their Papers or, where these had been distributed in advance, to introduce them and highlight the main issues. Discussion followed each group of papers and two contributors, Mr. Tansu Gurpinar and Mr. R.F. Porter, also showed slides illustrating the habitats and birdlife of some of the important areas.

For the purposes of this Report, the Papers have been re-grouped under the following heads : (a) general ecological background (two papers) (b) surveys of the country's wetlands and their wildfowl stocks (four papers), (c) the special case of the Manyas Gölü Kuş Cenneti, the Lake Manyas Bird Sanctuary National Park (two papers) and (d) the importance of Turkish wetlands especially for wildfowl, and problems involved in the application of the MAS Project to their conservation (four papers).

Due to the large number of contributions and to the fact that several of them which it had not been possible to distribute in advance, were read in full, discussions generally took place at intervals and with reference to several papers. The main points raised in discussion are, therefore, summarised here at the end of the section.





(a) Introductory Papers

THE ECOLOGICAL BACKGROUND OF LAND USE
IN TURKEY WITH SPECIAL REFERENCE TO WETLANDS

by

Dr. Hasan Selçuk

I. INTRODUCTION

Because of its geographical and geopolitical location Turkey has witnessed innumerable incursions and wars since the beginning of history; it has served as home and fatherland to many races, nations and states and has been the scene of various cultural, social and economic endeavours. Its peoples have exploited natural resources in accordance with the science, understanding and technology of their times. As long as they took note of the laws of nature they found it possible to do this in a rational way. When however they acted in contravention of these laws, they tended to destroy the natural balance. The Turkey, which our generation has inherited, can be described in the following brief outline.

II. GEOGRAPHICAL LOCATION AND GENERAL TOPOGRAPHIC POSITION

Turkey is situated between 36°- 42° N. and 26°- 45° E., surrounded by sea on three sides and with an area of 780,600 sq. km. split by the straits of Marmara and the Bosphorus into the western part of Asia known as Anatolia and the south-eastern corner of Europe known as Thrace. A rectangle about 1600 km. long and 650 km. wide, its land frontiers extend over 2,753 km. and its coast is about 8,209 km. long. The plateau of Anatolia drops in height from east to west, from an average in eastern Anatolia of over 1,500 m. to 1,000 m. in Central Anatolia and sea level along the Aegean seaboard. The average altitude of Anatolia is 1,130 m. and that of Thrace 330 m.

The Taurus and the north Anatolian ranges, parallel to the Mediterranean and the Black Sea coasts respectively, separate the coast from the interior with the exception of some high passes. These ranges, because of their direction and drop in altitude, divide the region over which they extend into three sub-regions. The north Anatolian and the Taurus ranges tend to merge in the east to form the highest ranges and mountains of Turkey (e.g. Kaçkar 3,937 m., Ağrı 5,165 m., Suphan 4,437 m., Cilo 4,168 m.). In Eastern and Central Anatolia, which is a plateau, there are some secondary ranges and old volcanic masses. The highest in Central Anatolia is Mount Erciyes (3,916 m). The mountain masses of Western Anatolia and Marmara are steep sloping, cut by running water. The highest points in these mountains are below 2,600 m. (Ronaz 2,571 m. and Uludağ 2,543 m.). South-eastern Anatolia is a plain lying at about 500 m., bounded on the north by the Taurus.

Most of the rivers and streams are not navigable, being too shallow and with sharp falls in level, winding courses and rapid flow. The most important beginning from the north-east corner, are the Çoruk, Yeşilirmak, Kizilirmak, Kilyos, Sakarya, Meriç, Susurluk, Gediz,

Küçükmenderes, Büyükmenderes, Dalaman, Aksu, Göksu, Seyhan, Ceyhan, Asi Irmağı, Fırat (Euphrates), Dicle (Tigris) and Aras respectively. Plains are usually confined to areas where the valleys widen or around river deltas.

Altitude, proximity and accessibility to the sea or otherwise the nature of water bodies, whether stagnant or moving, are the main factors governing the country's varied physical structure. On general topographical grounds it is usually divided for the purposes of study into the following seven regions :-

- a. Black Sea Region (eastern, central and western)
- b. Marmara Region (Anatolian sector, Thrace)
- c. Aegean Region
- d. Mediterranean Region (eastern and western)
- e. South-eastern Anatolia
- f. Eastern Anatolia (Erzurum-Kars Plateau, the plain of Van, east-central Anatolia)
- g. Central Anatolia (central and west-central).

Large and small lakes and the wetlands or marshes, which are usually but not always maintained by floods caused by run off, are to be found especially in the following plains areas (beginning again from the north-east): Terme, Erbaa, Taşova, Çarşamba, Bafra, Alaşehir, Salihli, Turgutlu, Manisa, Akhisar, Tire, Ödemiş, Denizli, Aydın, Söke, Dalaman, Antalya, Adana, Ceyhan, Amik, Malatya, Muş, Karan and Iğdır.

The majority of the lakes which altogether cover an area of 9,500 sq. km., are found in the western half of Anatolia, the most important in size being : Lake Van, Tuz, Beyşehir, Eğirdir, Iznik, Burdur, Manyas, Acıgöl, Apolyont, Suğla, Çıldır, Akşehir, Eber, Erçek, Amik, Hazar, Bafra, Köyoeğiz, Sapanca, Azap, Terkos, Küçük Çekmece and Büyük Çekmece.

III. CLIMATE

Although Turkey is in the temperate zone the interrelationship between physical features, sea and exposure to winds, causes wide climatic variation, which can be summarised as follows for the seven main geographical regions :

1. Mediterranean

Generally on the coastal strip summers are hot and dry, winters mild and rainy. Rain starts in autumn and lasts until the middle of spring. Maximum shade temperature in the Summer reaches 45°C. The temperature hardly falls below 0°C in the Winter. Higher altitudes, although still subject to summer drought, have a cooler temperature than the coastal strip and there is snow in the Winter. South-westerly winds bring rain, while areas exposed to the north-east wind tend to be dry. Sun intensity is vgrly high except on overcast days. Average annual temperature is 25° C. and average annual rainfall 500 - 1000 mm.

2. Aegean

The climate is somewhat similar to that on the Mediterranean coast. Summers are cooler though dry, the winters are rainy. Although the topography allows the rain-bearing south-westerly wind to penetrate

inland, the central and the north-western areas get occasional snow and winters are cold. The average annual rainfall ranges between 300 - 1000 mm. and the average annual temperature between 24° - 28° C. Rain falls from autumn till the end of spring.

3. Marmara

Although the climate in the Marmara region generally resembles that of the Aegean region, it is a little cooler. The winters are cold and snowy in the highlands of both the Anatolian and Thracian sectors. The average annual temperature is 24° C. and the average annual rainfall ranges between 500 - 1000 mm. Rainfall on the Ergene plain is less, ranging between 300 - 500 mm.

4. Black Sea

The summer drought is shorter as one moves eastwards, disappearing completely in the north-eastern area, which has rain throughout the year and is the wettest part of Turkey, with annual precipitation reaching 2500 mm. The climate is mild thanks to the Caucasus range which provides shelter from the north-east wind. The average annual temperature is 23° C. At the western end, which is exposed to cold winds, winters are cold and snowy, but further east snow lies only on high ground.

5. Central Anatolia

Generally winter cold increases as one moves eastwards. Rain begins to fall in the autumn and lasts until the end of spring. Winters are snowy and cold, summer is dry. The average temperature for the hottest month is 22° C, the average annual temperature 18° C. and the average annual rainfall about 350 mm. The temperature range between day and night and between winter and summer is between 15° and 18° C. Around the Salt Lake (Tuz. Gölü) annual rainfall drops to 250 mm.

6. Eastern Anatolia

Because of the very high mountainous character of this region, winters are severely cold and the temperature may drop to - 43° C. Summers are short and cool, though hotter in enclosed valleys. Average annual temperature falls as low as 6° C. as one moves eastwards. Average annual rainfall ranges between 350 - 1200 mm. There is a great range between day and night, summer and winter temperatures. A milder climate prevails in some valleys.

7. South-eastern Anatolia

Summers, especially during day time, are very hot, maximum temperature reaching 46°C. They are also extremely dry. Annual average temperature is over 30°C., annual average rainfall 300 - 500 mm. Southern areas have a desert-like climate. Rain falls only in the winter and spring.

In brief, except in the eastern Black Sea region, there is a deficiency in the water balance during the growing season of plants. Evaporation is excessive and drought is widespread.

IV. THE SOILS

1. Zonal Soils.

- a. Tundra soils : these soils, with a large grain and very little organic matter, are found on high mountains such as Agri, Suphan and Erciyes.
- b. Podsol soils : found in the eastern Black Sea region with its forests and heavy rainfall. Their physical structure ranges from loam to clay. Upper layers are brownish red, lower layers yellowish red. The pH ranges between 5, 5-6, 0. Organic material content is 2-6%.
- c. Brown forest soils : widespread in the central and western Black Sea region and of podsollic origin. The brown colour indicates humus. The pH varies between 5, 5-7, 0. The formation of soil is quick. There is a free accumulation of lime in lower layers.
- d. Chernosem soils : found in the plains of Eastern Anatolia, rich in organic matter. The pH is 6, 0-7, 0 ; p is deficient.
- e. Reddish-brown soils : Found in Central Anatolia in places with 300 - 450 mm rainfall ; rich in lime. The pH ranges between 7, 5-3, 0. Poor in organic matter and of medium or fine grain, but rich in nutrients.
- f. Sierozem soils : found around the Tuz Gölü where rainfall is below 300 mm, of coarse texture, with a poor ability to hold water. Diluted salt density is high.
- g. Terra rosa soils : originating from limestone in the Mediterranean coastal strip, the South-Eastern and the Aegean regions. Bed in colour, the pH is 6, 5-7, 5; poor in organic matter. There is a deficiency of phosphorus and nitrogen.
- h. Grunusol soils : originating from basic rock of clay and limestone found in Central Thrace and Marmara. They have slight acid reaction and free lime abounds amongst the layers. Strong tendency to become compacted.

2. Interzonal Soils.

- a. Rendzina soils : widespread in Northern Thrace, originating from limestone. The 'A' horizon is rich in humus; the 'B' horizon is non-existent. The pH ranges between 5-6. There is a deficiency of phosphorus.
- b. Hydromorphic soils : Can be seen in places with poor drainage outlet. Most of these contain Na and Ca salts.

3. Azonal Soils.

- a. Alluvial soils : predominant along all permanent streams and in deltas. Flooding and salinity tend to occur.

V. PLANTS AND ANIMALS

Parallel with the wide variations of topography, climate and soil described above, both animal and plant life, as far as species are concerned, are obviously very rich. The information available at present is, however, incomplete and does not allow detailed analysis at a specific level.

1. Planktonic, phanerophytic and epiphytic species are all well represented in the rich flora. Excluding local and introduced horticultural species developed and multiplied by man, the natural flora shows great variation in its distribution and environmental preferences.

One would very much like to see the true botanical and sociological position of plant life worked out in detail (which has not yet been done), so that the facts obtained could be utilised and applied.

2. Nor is the true picture of animal-life in Turkey yet clear. What we know consists of not more than we have seen or heard, but nevertheless we have to admit that animal-life, in keeping with the variety of plant life, is very rich. It is significant that out of 75-80 million domesticated livestock in Turkey, about 95% are living off natural pastures.

VI. POPULATION

According to the 1965 census the population of Turkey is 32,000,000. The average density is 41 persons to the sq. km. and is generally higher on the coast and plains than in central or mountainous regions. The population is spread over more than 65,000 settlements and about 70% of it consists of peasants who are either farmers, livestock breeders, or earn their living from the forest. In about 600 of the settlements the population is above 3000, in 190 above 10,000, in 30 between 50,000 - 100,000, in 14 above 100,000 and in the rest below 3,000. The rate of growth in the population of Turkey is about 3%.

VII. METHODS OF UTILISATION OF NATURAL RESOURCES AND ENERGY.

Most of the natural ecosystems and energy which we have attempted to describe are being utilised for such purposes as agriculture, stock-breeding, tourism, etc. But neither these methods of utilisation nor any others have yet been applied according to a co-ordinated and complementary plan based on a specific national economic policy. Every department behaves as though it were completely independent, having failed to realise that it cannot use natural resources and energy whenever and wherever it chooses. This is of course explicable by the fact that in Turkey we do not yet know the true potential of our natural resources. Because we have not identified the factors governing them and their natural laws through research and investigations, we are unable to achieve economic planning based on biology and ecology. The Five-Year Development Plans prepared by the State Planning Organisation cannot therefore attain the desired targets without setbacks, because the various individual organisations are not geared to co-operation and content themselves with obtaining facts solely for their own needs. It is on this unscientific basis that 35 million hectares of land in Turkey, out of a total of 78.5 million hectares, is being utilized in animal husbandry (in the form of pastures). Another 19 million hectares are used in agriculture and 10.5 million hectares in forestry, the remaining 15 million hectares consisting theoretically of land that cannot be utilized in these main ways.

The water regime of Turkey comprises about 8,300 km. of coastline, over 9,500 sq. km. of lakes and over 15,000 km. of rivers and streams. Utilisation includes hunting, fishing, irrigation, the tourist industry and other industries, such as mining, but relations between these forms of use tend to play a destructive rather than constructive part in the natural order. The pattern of human settlement in no way accords with availability of natural energy or economic and social conditions, with adverse consequences on productivity. Thus agriculture and animal husbandry have tended to become shifting operational units, destroying natural vegetation, paving the way to soil erosion and pushing back the forest into remote inaccessible areas. This has helped to make forests deficient

both in quantity and quality, unable to yield the economic values and services desired, which in turn has adversely affected a water regime that is already inadequate and, whether in the form of flowing or static waters, has often been allowed to be a destructive element or one of which the potential uses have been allowed to cancel each other out. Hence, before properly surveying the biological situation and ascertaining the facts as to surface and underground supplies, soil and rainfall, the Directorates of D.S.I., TOPRAKSU and Forests are forced to undertake expensive investments in the form of dams, canals, drainage ditches and terraces to protect inhabited areas and productive lands, with in some cases resulting destruction of the biocenosis.

Hunting, tourism, holiday resorts and other recreational facilities (except in forest reserves, national parks and restricted areas) are not only senselessly over-exploited, but are also wasting natural resources and opportunities for other kinds of productivity and, in the process, are exterminating plant, animal and even historic treasures. In the location of industries, biological considerations are more often than not overlooked, attention being paid only to technical or economic factors, so that the whole existing plant cover and ecology are destroyed. Thus, mining is carried out mechanically without thought for the living and dead economic values of the environment and, when roads are built, their location and standards are determined only by reference to time, speed and traffic control and completely overlooking the irreparable harm and loss they may cause to the natural ecosystem.

VIII. CONCLUSION AND SUGGESTIONS

Turkey is not the only country where exploitation of natural resources and energy is not carried out in accordance with economic plans based on biology and ecology. With the exception of only a few countries, this is a common situation in all nations. Man's desires and needs have increased in our time and meeting the demands has necessitated multilateral and co-ordinated action, not only because the distribution of material resources to meet demands is not uniform either in quality or quantity, but also because the total supply is limited. Because this is a new situation, no internationally accepted basis for recognising and understanding the problems involved can yet be considered to have been established. This is why national and international organisations set up for the purpose of regulating the methods of conserving and exploiting natural resources and energy, have such an immense task to fulfil, through -

1. exchange of scientific knowledge, technology, personnel and equipment;
2. intensification of efforts to warn, teach and train the public in the special features of natural resources and energy and in the significance and place of these in the life and economy of the community;
3. finding ways and means of securing, co-ordinating and complementing co-operation between all organisations entrusted with the task of assessing, conserving and utilising natural resources and energy;
4. determining the principles and methods underlying the practical application of ecological research into biocenoses (a possible field, where matters of international importance are concerned, for I.U.C.N. leadership).

At a national level, on the other hand, the following seem to be the main tasks in Turkey :-

1. natural resources and energy must be managed on a watershed basis (the existing D.S.I. Divisions are adapted for this purpose);
2. exploitation of natural resources and energy must be carried out in accordance with a general plan based on biology and ecology;
3. planning, management and control works must be placed under the charge of one of the Ministries;
4. field teams, composed of geologists, biologists, meteorologists, botanists, agriculturists, foresters, hydrologists, economists and soil experts must be set up to start work as soon as possible on biological and ecological research and inventory, using plant sociology and vegetation methods;
5. until the overall plan is completed, all investments such as new establishments, extension or re-organisation work included in the current 5-year Plan should be given priority for local biological and ecological investigation and, where necessary, must be modified or corrected;
6. before water resources (both surface and underground) which are of a particular importance for Turkey are used for the purposes of tourism, recreation, sport and hunting, the legislation and control necessary for conserving their biological resources and ecology must be introduced and the equipment and methods to be used must be determined;
7. measures must be taken to prevent the destruction or illegal export of every kind of biological, ecological and historical resource, energy and national asset;
8. publicity and propaganda, aimed at educating and training the public to realise the importance and potentials of natural resources and energy for the national economy must be intensified;
9. co-operation with local and international organisations and societies concerned with the investigation, conservation and exploitation of natural resources and energy must be stepped up;
10. results of investigations must be made available on ecological maps of sufficiently large scale, which the State Planning Organisation can submit to the executive agencies concerned before the Third Five-Year Development Plan is prepared;
11. during the process of investigation and appraisal all possible use must be made of the ministerial research establishments and close co-operation with universities maintained.

THE OVER-ALL PROBLEMS OF WETLANDS IN TURKEY, WITH
SPECIAL REFERENCE TO USE AND LEGISLATION.

by
Ahmet Varişlıgil

I. INTRODUCTION

The main organisation responsible for the development of water and soil in Turkey is the Directorate General of State Water Works (D.S.I.).

The value of wetlands, which have various origins, depends on the physical features of the region where they are situated. Usually the true value is realised only after the creation of problems that follow the disruption of the natural balance.

This article aims to provide a brief description of the characteristics of Turkish wetlands, of utilisation methods and of development possibilities. It will be very pleasing if, as a result of this Meeting, wetlands, which are of special importance for our country, become the scene of new developments.

II. WETLAND CHARACTERISTICS

A. Extent and Nature

Because of its varying climatic, topographic and drainage conditions, Turkey has very typical and widespread wetlands. They occur in almost all the 26 river basins and cover something like 350,000 hectares. Of this total 200,000 hectares have been surveyed, 150,000 hectares drained and the remaining 50,000 hectares scheduled for drainage. T.L. 157 million (at the 1964 valuation) have been invested in the wetlands drained. For the purpose of these figures, land covered by surface water several metres deep but less than six metres, and usually formed through natural means, whether permanent or otherwise, stagnant or moving, is classified as wetland.

The underlying soil of wetlands is mineral or organic soil, and in Turkey 80% of it is mineral. Wetlands with an organic soil are usually neutral or with very little alkali reaction and are very suitable for agriculture.

Because drainage is usually bad, the water of wetlands tends to increase in salinity as a result of evaporation. In Turkey there are almost no wetlands with acid reaction. Both surface and subsoil water may be salty and in some cases the salinity is three to four times stronger than sea-water, i.e. up to 50,000 ppm.

B. Importance

Turkish wetlands vary in size from one or two hectares up to 25,000 hectares. Those which are situated on the coast are of a homogeneous and perpetual character and allow very little possibility of utilisation. Inland wetlands such as Aslim, Konya, Çifteler and Eskişehir vary in size according to the season. Although these wetlands have an important potential as far as soil and water is concerned, they have not yet been fully studied as far as their plant and animal life is concerned. The wetlands of Central Anatolia, which receive an

average rainfall of 400 - 500 mm. with almost no rainfall at germination season, present conditions favourable for multi-purpose utilisation. An annual average income of T.L. 150 million is obtained from the lands already drained.

Wetland drainage and improvement works in Turkey were first inaugurated in 1919 at Çanakkale - Kumkale. The Ministry of Health began with drainage projects specifically aimed at preventing malaria. Following the establishment of B.S.I. in 1955, drainage and improvement of wetlands was entrusted to that organisation.

III. METHODS OF WETLAND UTILISATION

A. Traditional Utilisation Methods

Utilisation of wetlands in the past took the form of reed-cutting, fishing and grazing. The growth in population and the need for new settlements have forced a change from these traditional methods.

B. Key Types of Utilisation

Of the wetlands drained, 54,000 hectares have been put under agriculture and another part has been planted up with eucalyptus. In addition rice cultivation, fishing, pastures and game reserves have been promoted. The fact that in recent years some shallow lakes have been developed for recreational activities is significant in that it has shown that the scope of what can be done in the development of wetlands can be enlarged.

IV. CO-OPERATION IN WETLAND DRAINAGE : CONSEQUENTIAL PROBLEMS

A. Co-operation in Wetland Drainage

1. The Directorate General of D.S.I. and the Land Registration and Cadastral Surveys department are responsible respectively for the delimitation of wetlands and the preparation of cadastral plans.
2. The Directorate General of D.S.I. and the Directorate General of National Real Estates co-operate in deciding how much of the wetlands already drained and improved is to be allotted to D.S.I. for maintenance and development works.
3. The Directorate General of D.S.I., TOPRAKSU and the Resettlement and National Real Estates department co-operate in the task of distributing reclaimed land to the villagers.
4. On state-owned wetlands that have been drained and considered suitable for afforestation, this is undertaken in co-operation with the Directorate General of Forestry, while where a question of loans to individuals arises, there is co-operation with the Agricultural Bank.

B. Problems on Drained Wetlands

Problems that hamper the achievement of optimum utilisation of wetlands that have been drained can be briefly summarised as :-

1. failure to provide the necessary water both for preventing the desiccation of drained wetland and for irrigation purposes, and failure to regulate the water-table;
2. collapse or blocking of drainage and irrigation canals because of the deep loose organic soils of former marshland.

V. POSSIBILITIES OF WETLAND DEVELOPMENT

Technical, legal and administrative aspects of the possibilities of multi-purpose utilisation resulting from improvement work already undertaken or to be undertaken, can be summarised as follows:-

A. Technical aspects

Wetlands lose their character when there is a major diversion of the causes that gave birth to them. Such diversion or change must therefore be based on studies and planning aimed at multi-purpose utilisation. The Directorate General of D.S.I. whose job it is to drain and improve wetlands, should therefore carry out these studies according to a master plan in which all interested organisations should participate. Only in this way can the course of improvement and the types of utilisation after improvement be properly determined.

B. Administrative and Legal aspects

The existing pattern of co-operation between responsible departments in dealing with the work required before and after the drainage of wetlands has been outlined in Section IV - A above.

Regarding the responsibilities and powers of the Directorate General of D.S.I. in connection with the improvement of wetlands, the newly prepared "Water Sights Bill" provides that " the competent organisation will adopt all necessary measures to prevent acts of intervention liable to reduce the economic, touristic and aesthetic values of water and soil resources, and to ensure that maintenance and repair is carried out on time". This in effect establishes the concept of multi-purpose utilisation and future studies must be carried out accordingly.

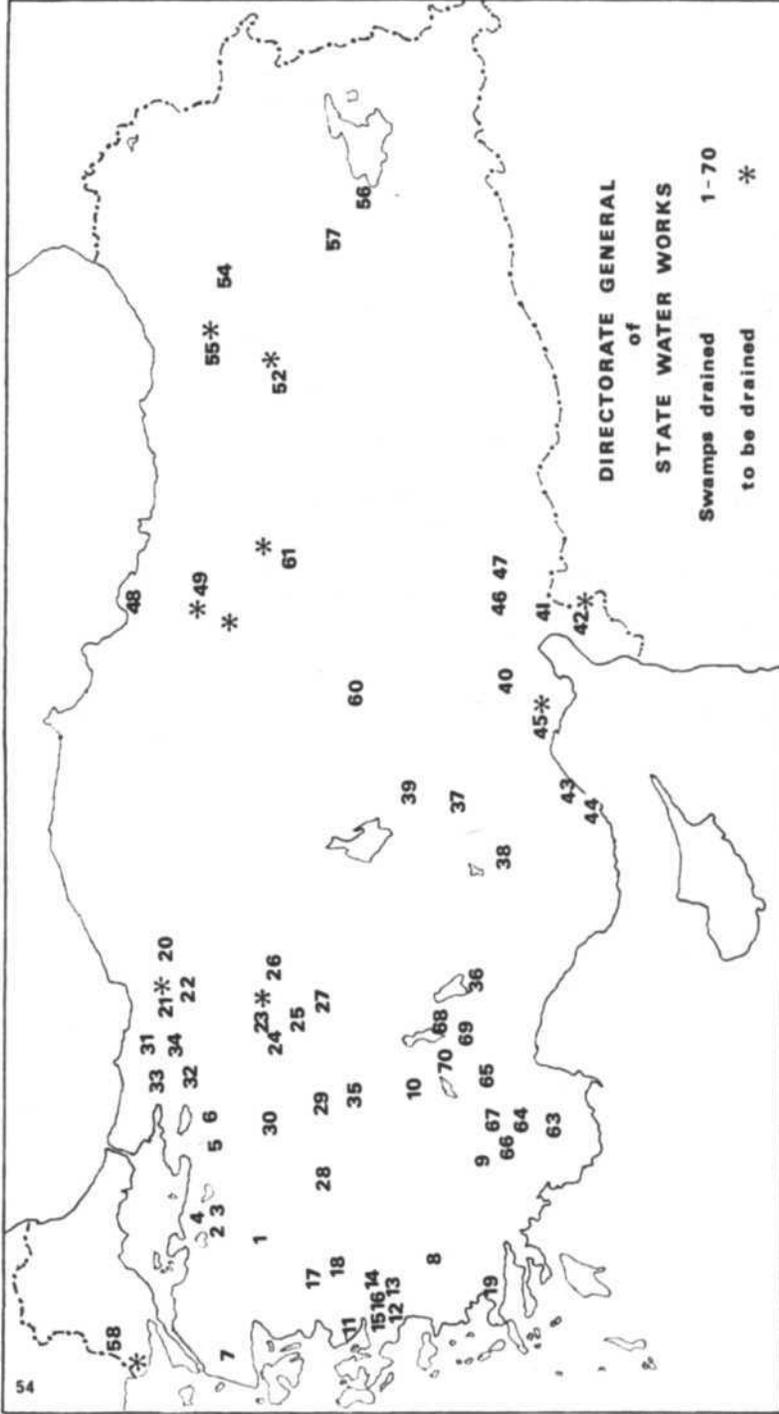


Fig. 2 Drainage works undertaken by the Directorate of DSI (State Water Works)

Table 1 : DRAINAGE WORKS UNDERTAKEN BY THE GENERAL DIRECTORATE OF DSI.

PROVINCE	MAP NO	NAME OF SWAMP	LAND DRAINED (Hectares)	LAND TO BE DRAINED (Hectares)	TOTAL (Hectares)
Balıkesir	1-	Halalca Bataklığı	200	142	342
"	2-	Manyas ovası islâhi	1000	656	1656
Bursa	3-	Karacabey ovası islâhi	1250	250	1500
"	4-	M. kemaipaşa ovası islâhi	1860	-	1860
"	5-	Bursa ovası islâhi	1500	-	1500
"	6-	Marmaracik bataklığı	1425	75	1500
Çanakkale	7-	Kumkale Bataklığı	1063	-	1063
Aydın	8-	Aydın Bataklığı	300	-	300
Denizli	9-	Acipayam Bataklığı	3300	-	3300
"	10-	Isıklıgölü bataklığı	1800	-	1800
İzmir	11-	Menemen-K.çigli Bataklığı	70	-	70
"	12-	Selçuk-Eleman Batatlığı	550	-	550
"	13-	Selçuk-Tire Belevi Bataklığı	572	-	572
"	14-	Torbali-Cellat Bataklığı	1200	-	1200
"	15-	Torbali-Gümüş Bataklığı	425	-	425
"	16-	Torbali-Nohut Bataklığı	400	-	400
Manisa	17-	Kumçayı Manzumesi islâhi	4000	-	4000
"	18-	Rahmiye Bataklığı	860	-	860
Muğla	19-	Milâs Tekfur anbari Bataklığı	3500	-	3500
Bolu	20-	Yeniçaga gölü kurutulması	800	-	800
"	21-	Düze Efteni gölü kurutulması	500	2000	2500
"	22-	Mudurnu menbai islâhi	2274	-	2274
Eskişehir	23-	Eskişehir ovası ve Forsuk çayı islâhi	11246	400	11646
"	24-	Lütfiye Sarısu Bataklığı	3125	-	3125
"	25-	Çifteler-İhsaniye Bataklığı	1081	-	1081

Table 1 . continued

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PROVINCE	MAP NO	NAME OF SWAMP	LAND DRAINED (Hectares)	LAND TO BE DRAINED (Hectares)	TOTAL (Hectares)
Eskişehir	26-	Sakarya-Kavuncu bataklığı	3033	-	3033
"	27-	Zadiroğlu alıkan bataklığı	2060	-	2060
Kütahya	28-	Simav gölü bataklığı	2100	3264	5364
"	29-	Altıtaş bataklığı	1800	-	1800
"	30-	Tavsanlı bataklığı	150	-	150
Sakarya	31-	Arifiye bataklığı	100	-	100
"	32-	Pamukova bataklığı	800	-	800
"	33-	Gökçeören bataklığı	5000	-	5000
"	34-	Süleymaniye bataklığı	-	6800	6800
Afyon	35-	Sincanlı bataklığı	50	-	50
Konya	36-	Beyşehir-Eflâatun bataklığı	800	-	800
"	37-	Ereğli bataklığı	1000	-	1000
"	38-	Karaman Suğla gölü bataklığı	2100	-	2100
Niğde	39-	Aksaray-Saz bataklığı	700	-	700
Adana	40-	Kozan-Karakulak bataklığı	300	-	300
Gaziantep	41-	İslâhiye-Emen gölü bataklığı	2000	300	2300
Hatay	42-	Amikgölü bataklığı	23800	4600	28400
İçel	43-	Erdemli bataklığı	300	-	300
"	44-	Silifke ovası islâhi	1000	-	1000
"	45-	Tarsus-Aynaz bataklığı	520	480	1000
Maraş	46-	Gâvür gölü bataklığı	5200	2000	7200
"	47-	Mizmilli bataklığı	1700	400	2100
Samsun	48-	Çarşamba ovası bataklıkları	10000	-	10000

Table 1 . continued

PROVINCE	MAP No	NAME OF SWAMP	LAND DRAINED (Hectares)	LAND TO BE DRAINED (Hectares)	TOTAL, (Hectares)
Tokat		49-Niksar ovası ıslâhı	1800	-	1800
"		50-Kazova ovası ıslâhı	-	5000	5000
"		51-Erbaa ovası ıslâhı	-	800	800
Erzincan		52-Erzincan ovası ıslâhı	5080	4000	9080
"		53-Altınbasak Bataklığı	-	765	765
Erzurum		54-Karasu Bataklığı	4500	-	4500
Gümüşhane		55-Bayburt sünürovası ıslâhı	3900	999	4899
Bitlis		56-Tatvan-Resadiye göllü ovası kurutulması	500	-	500
Muş		57-Varto karaköy Bataklığı	600	-	600
Edirne		58-Karasazlık Bataklığı	2940	725	3665
"		59-Galağöllü ve civri bataklığı	-	10230	10230
Kayseri		60-Karasaz Bataklığı	3018	-	3018
Sivas		61-Ulas gölü Bataklığı	520	-	520
"		62-Hafik Gevdis Bataklığı	-	570	570
Antalya		63-Elmalı Karagöl ve Avlan Bataklıkları	-	8700	8700
"		64-Söğüt gölü Bataklığı	4000	-	4000
Burdur		65-Bucak kestel gölü Bataklığı	2000	-	2000
"		66-Gölnhisar Bataklığı	700	-	700
"		67-Tefenni-Pınarbaşı Bataklığı	1000	-	1000
Isparta		68-Eğridir gölayağı Bataklığı	800	-	800
"		69-Eğridir Yılanlı Bataklığı	187	-	187
"		70-Eğridir Gönen Bataklığı	200	-	200

(b) Preliminary Surveys of Turkish wetlands and wildfowl stocks.

REPORT OF THE FIRST IWRB - MAE MISSION TO TURKEY

by

Dr. Josef Szijj and Hayo H. Hoekstra.

Introduction

The aims of the first IWRB-MAR Mission to Turkey were :

1. To estimate numbers of wintering waterfowl on the most important wetlands of western Turkey, based upon as accurate as possible ground counts;
2. To gather general information on the nature of these wetlands.
3. To form an idea of the impact of human activities on wildfowl and wetlands (hydroworks, hunting, etc.);
4. To make proposals for management and conservation in the near future.
5. To contact representatives of the Turkish government concerning the proposed technical meeting of the International Union for Conservation of Nature and Natural Resources (IUCN) and Turkish officials and ornithologists generally for purposes of future co-operation;
6. To make observations on the ecology, behaviour and occurrence of several Anatidae rare to Europe.

The following is a summary of our observations on each of the wetlands visited:-

MERİÇ

Only a very small part of the large area of the Meric river and delta, on the Turkish side, was visited. The area seen was mostly rice-paddies with many low dams and dikes. The fields were very muddy with puddles of water. The Meriç had a high water level; there are many small islands and reed beds and inundated fields inside the dikes next to the river itself. The evening flights of Anatidae came from the direction of these areas. The birds were seen to settle on the inundated rice-paddies and on the muddy fields. This area must be a very important wintering place because of the open water, the feeding grounds and resting places.

Hunting pressure, especially at weekends, is very high and ever increasing. This, combined with water regulation and drainage projects, is, according to local information, already menacing the number of birds. If it continues without consideration for the birds, this area will doubtless lose a great deal of its ornithological value.

Between the Meriç and Istanbul are two smaller lakes of which Lake Büyük Çekmeça is the most important. No Anatidae in any number were seen, only Podicipedidae. Both lakes had a high water level.

Lake Büyük Çekmeçe has, we were told in Istanbul, a certain attraction for hunters and could, if well managed, become an important site.

BAY OF IZMIR

The road from Istanbul to Bursa hugs this bay and conditions for observing are excellent. The road goes through a small marshy area on the east side where Limicolae were observed. In the bay, several covered butts were seen, as were many hunters around the area. Because of its situation (industry, hunting pressure, feeding possibilities) this bay has no great importance for wintering birds.

LAKE APOLYONT

The south and east shores of this lake (about 23 km. long and up to 12 km. broad) border on mountains and hills, whereas the other shores are low-lying fields, especially the western side, along which there is a large dike. There is also a narrow often interrupted reed belt on the west side which is thicker around the mouth of the river Kermasti. On the dike is a very modern and large pumping station which is draining the area west of the lake in the direction of Lake Manyas. These fields probably form the main feeding places in this region for geese and ducks.

North of the lake there is a delta area which is said to have a certain importance. The region between Apolyont and Manyas is inundated and inaccessible during our visit. It is undoubtedly an important feeding ground. There appeared to be quite a heavy hunting pressures we saw fifty hunters with and without boats, some hiding in the reeds, some using live decoys.

The importance of Apolyont as a wintering place could probably be better judged when the water level is lower and the adjoining fields can be used for feeding. Most of the ducks we saw, however, were diving ducks, for which the lake probably always has a considerable attraction.

LAKE MANYAS

We made a trip by boat, covering about one third of the total shore length of this 150 sq. km. lake and also watched the evening flights on the south-east side, where the river Koca enters. The water level was very high, and, according to the warden of the nature reserve, is usually several metres higher in winter than in summer. The lake is probably of importance for Anatidae during extreme climatic conditions.

Coots were seen feeding mainly along the shore and almost no diving ducks were seen. The lake has not many reed belts offering protection and cover; even in the north-east side near the reserve there are only narrow and poor stands.

The hunting pressure seems heavy; during the evening flight about one hundred shots were counted. Local information confirmed this hunting pressure. We saw numerous hunters with woodcock, coots and smaller wading birds. We saw also hunting with live decoys (mallard).

This lake could probably have a greater importance for wintering Anatidae if several conditions were fulfilled; among these in the first place less hunting pressure and more small protected areas with reed-belts, etc.

DELTA AREA OF THE RIVER GÖNEN

A rather narrow area adjoining the Sea of Marmara. The freshwater surfaces are too small to accommodate large concentrations of Anatidae but seem to have a certain importance for Limicolae. Some geese were seen, probably chased by an approaching blizzard towards this area from other regions.

DELTA OF THE RIVER KOCABAS NEAR KARABIGA

This area is considerably larger. It has more open water surfaces, inundated meadows and extensive rice paddies. The paddies have many smaller open water areas which provide feeding places for Anatidae, which were observed coming in from the sea in the evening during very bad weather. The geese observed may also well have been brought to the area by snowstorms elsewhere.

DELTA OF THE RIVER YEŞİL IRMAK

This is a large triangular area near the city of Samsun with many marshes and lakes of varying sizes on both sides of the small river. We visited Late Ak (only seen from afar because of deep snow and frozen waters), the fresh water marshes east of Terme and the lagoons and meadows west of the river. On the Black Sea we observed many large flocks of ducks which could not be identified. Most of the duck of the lake and marsh area were surface feeders, totalling at least 7,000, of which we estimated 75% to be Mallard. Hunters said that there were very many geese but we only saw a few. The Yeşil has two arms of which we visited the western one. The birds observed formed only a minor part of the actual number present. The actual number may have been about twenty thousand birds.

The whole area is being afforested with poplars. There is a heavy hunting pressure. Local information showed that very many hunters, even from far afield, visit this area. We fear that the comparatively small water surfaces, the rather poor possibilities of feeding, the afforestation and the heavy hunting pressure will mean that the importance of this area for duck will decline and might eventually disappear completely.

DELTA OF THE RIVER KIZIL IRMAK

This delta resembles that of the Yeşil: west and east of the river there are marshes and lakes of varying sizes. But it differs because of a lack of dense population and no afforestation projects. A small strip of sandy dunes on the west side, and a narrow area of marshy, woody country on the east side of the Kızıl Irmak, separate the sea from the lakes and marshes. Canals are used to regulate the water level of Lake Karabogaz (on the west side). Lake Balık has probably also connection with the sea although the water tasted completely fresh.

Lake Karabogaz owes its importance to the fact that it is difficult to reach in winter. The lake is about eight kilometres long, some one and a half kilometres wide and up to one or two metres deep, according to local fishermen. Enormous reed beds offer excellent protection. The water tasted slightly salty. Birds were observed mainly during evening flights towards the sea or in the direction of Lake Balık and in the morning returning from the sea towards the lake. Hunting pressure seemed very slight.

Lake Balık is about 20 km. long. The shores on the northern side are without reeds but on the west and south sides there are many reed beds, marshes and inundated meadows. Almost all ducks were observed on these inundated grounds; the geese were seen in the western half, where, according to local information, they usually are. Hunting pressure seems slightly higher; the lake is accessible and there are several villages near it.

This delta seems very much more important than the delta of the Yeşil: much more water and marshes, no villages and agriculture or afforestation, very slight hunting pressure. Judging by the lack of favourable areas in this part of Turkey for waterbirds, at least parts of this area should be conserved and managed.

LAKE KARAMIK

A long (10 km.) and narrow (broadest point about 1.5 km.) lake, with high mountains all along the west and south sides. It is apparently a shallow lake, judging by duck feeding in the middle of the open water surfaces; about 75% of the surface is covered with reeds. The largest and at the time of our visit only open water surface was in the south. This was kept open by a warm water spring. Here we found a relatively large concentration of birds. There is a rich underwater vegetation and the reeds had been cut.

Hunting pressure appeared to be very heavy. The whole area is being drained and it was stated that by autumn 1967 the whole lake will disappear and become arable land. This will represent a considerable loss because, in the extreme climatic conditions in which we visited the lake, the availability of some open water was obviously of great importance to wildfowl.

LAKE EBER

This lake (17 km. long, about 10 km. broad) is mainly covered by reeds. The open water was almost completely frozen except for the flowing stream which enters on one side and leaves the lake on the other, flowing towards Lake Akşehir. West of Lake Eber a smaller lake (said to be formerly important for duck and geese) has been drained completely. There are also already drainage plans for Lake Eber.

Apart from the large concentration of wigeon, almost all other ducks were either on the ice or in the open water. The geese were seen in the neighbouring low hills feeding in several huge flocks on young sprouts of wheat. Hunting pressure seems to be quite substantial; several towns around the lake have a large number of people interested in hunting.

The most important areas visited were where two small streams flow into Hoyran, especially one on the western side. Here was what appeared to be soda flats, about 70 or 80 sq. km. in area with a long rather narrow belt of reeds along the shore, west of which was arable land. Geese and duck were seen feeding on the mosses of the flats. Diving ducks were however concentrated on Lake Eğridir in important numbers. There is a small fishing village in the soda flats area but no other larger villages or towns in the vicinity, and we saw no drainage or hydro works nor any signs of great hunting pressure.

The concentrations of birds were high and this is obviously an excellent wintering place which should receive particular attention from the competent authorities for the purpose of conservation.

LAKE BURDUR

30 kilometres long and a maximum of 8 km. wide, this lake is said to be slightly arsenical and have no fish (although we observed Podicipedidae). The northern shore is rather steep, the others rather flat. The lake appeared to be attractive for diving ducks (White-headed Ducks were seen here, the only place where we observed this species). Geese were observed feeding actively on the arable lands bordering the lake. The north-eastern shore appeared to be especially good for wading birds. We saw no waterplants and no reeds. There were quite a number of hunters.

MENDERES

The delta of the river Menderes (mentioned by Homer for the richness of its waterfowl) is a large area, once a bay of the Aegean Sea of which Lake Bafa is the last remnant.

We classified the area in four sections :

Lagoons : about 15 km. broad, probably shallow water, separated from the sea and also from the hinterland by ridges of very low sand dunes without any vegetation.

Arable lands : occupying much of the delta; mainly cottonfields, which in winter are completely inundated but still offer good cover.

Lake Bafa : surrounded by mountains and in winter with a large inundated area towards the delta; probably deep, rich in fish (many Podicipedidae seen).

Inundated meadows, north-east of Söke, on both sides of a small branch of the Menderes.

We saw approximately two hundred thousand ducks and estimated the total numbers present to be at least three hundred thousand. Almost no geese were seen but we were told that they appear regularly in large numbers. The area is thus certainly very important. This is probably due to the large water surfaces where no disturbance is yet possible and the fact that very large feeding areas exist in the cotton fields and in the inundated and marshy meadows. Even with the existing hunting pressure, the wildfowl can therefore remain largely undisturbed. The geographical position is also important; the delta lies on the junction

LAKE AKŞEHİR

A large lake with extensive reed belts (about 22 km. long, about 18 km. broad) which was completely frozen over on our visit. Local fishermen reported that the lake, when not frozen, carries much larger concentrations of geese and ducks. The lake is rich in fish and no drainage projects were observed.

HOTAMİS

A very large marsh with enormous reed belts and apparently little open water. In the south-east, near the mountains, warm springs keep the water open, even when the temperatures are as far below zero as when the area was visited. North and west of this lake (the only part we could visit) there is extensive cultivation, with irrigation and drainage works.

These marshes are the main target of the hunters from the city of Konya. The local hunting club showed us their covered butts and two hunters bagged on one afternoon more than twenty duck. Other marshes between Konya and Hotamis, and further on near Ereğli were said to be also very good for duck and geese but, having no warm springs, were frozen over.

LAKE SUĞLA

An almost circular lake with a diameter of about six kilometres and a very varying water level. The water is being used for irrigation projects in the region of Konya.

We could not reach the narrow but extensive area of flowing open water on the west of the Lake, but observed many large flocks of ducks and some geese in flight, apparently heavily disturbed by a great many hunters. Covered butts were seen. Some arable land was snow-free and could have served as feeding places.

LAKE BEYŞEHİR

A large lake (about 35 km. long with a maximum width of 20 km.) but not deeper than 7 metres. The west side borders on relatively high mountains and has some small islands. The eastern shore has large bays, almost free of reeds and borders on low rolling hills.

The most important area is in the south-west corner, where a small stream flows into the lake, bordered by marsh and many reed beds. Its small delta is doubtless of great importance. We did not find any drainage projects. The concentrations of wildfowl on the lake were only on the southern side. A few hunters were seen.

LAKE EĞRİDİR (and LAKE HOYRAN)

This pair of lakes (more than forty kilometres long and about fifteen kilometres wide at the widest point) are very rich in fish; Eğridir is bordered by steep hills.

of the flyways of birds coming down from Anatolia and of those migrating south along the coast of the Aegean Sea,

The delta of the Menderes deserves full attention as a very important wintering area and one which will certainly keep its importance if the existing habitats are maintained without major changes.

Conclusions

It is difficult to form a decisive opinion about the complex of wetlands seen and their problems: we were only able to get a more or less "photographic" impression. It is fairly certain that under different weather conditions and at other seasons, the picture is different. In forming our opinions, we have taken into account the local information and information given by Turkish and foreign specialists, ornithologists and hunters.

The wetlands visited fall into two distinct groups - delta wetlands near the coast; and the wetlands of the Anatolian Highlands. The main factor in making this distinction is climatological: Anatolia, around 1,000 m. above sea level, has a continental climate; in winter it can be very cold indeed; the summers are hot and dry. The temperatures can vary much in a short space of time. Many wetlands may have little water in summer and many of them, except a few of the biggest lakes, may freeze in winter. Even the bigger lakes may partly freeze, thus losing much of their attraction for surface feeding ducks (especially when the surroundings are covered by snow). The land round many of the lakes is cultivated or used for sheep grazing. In short it is possible for conditions to change, one day to another, from optimum conditions to the opposite.

The wetlands near the coast are much less influenced by these extreme changes; most of them always have open water. The feeding grounds are also more favourable because of an often much more varied agriculture. On the other hand, many of these areas are smaller and are thus more subject to disturbance; an exception is the delta of the Menderes.

It is very possible for these coastal wetlands to serve as refuges for wildfowl when weather conditions either in other countries (the Balkans) or in Anatolia itself have grown bad. This is probably also why completely different numbers of wildfowl were reported on several wetlands shortly after our visit. Weather conditions were very near their worst during our visit and we therefore found large concentrations on the coastal wetlands, Kızıl, Menderes, etc. On the other hand the wetlands which kept open by warm water springs in Central Anatolia also had large concentrations of birds, even during the bad weather.

Change in Structure

We observed near many of the wetlands visited large works under construction, in almost all cases, as we were told, for drainage. We can at least state that most of the wetlands visited will shortly undergo important changes. We were told that the changes were to meet agricultural needs. The only artificial lake, or rather the only site where an existing lake is probably being converted into a larger lake, is Lake Çavuşcu, but we doubt if this change will be favourable for waterfowl.

Agricultural experts should consider whether such changes for purely agricultural purposes will have a large, over-all favourable effect for Turkey. They should at least consult with ecologists in order to create reserves or consult with other specialists to intensify the productivity of already existing arable land. It is very possible that several of those sites which are threatened with complete disappearance, could have a higher productivity in the future as hunting grounds, both for local people and possibly for tourism, than as arable lands only.

Hunting

The shooting of waterfowl in Turkey is apparently very important. We have seen that a very high percentage of the population possesses shotguns but appear to lack much respect for hunting laws. We believe, nevertheless, that these factors do not immediately threaten wildfowl, as do for instance the plans for drainage: we think that this high number of gun-owners do not present a very intensive hunting pressure. Many of the wetlands are not readily accessible, transportation and especially private vehicles are often lacking, many guns are of low quality and cartridges are expensive. Except for coots, which were seen taken in large numbers, mainly by children, we do not think that disproportionately large numbers of waterfowl are killed on the areas visited. A more adverse factor is probably general disturbance.

As in many other countries, education of hunters and of the corps of wardens and others who are charged with surveillance could greatly contribute towards a better concept of hunting and conservation. A first step towards urgently needed conservation is in our opinion the creation of a certain number of reserves with trained and responsible wardens, which may serve as refuges whenever the hunting pressure mounts in a certain region.

Future

Looking into the future, on the basis of our first impressions, we suggest that the future management of wetlands and wildfowl will involve more than the creation of a few new reserves. Wintering waterfowl often need a choice of many wetlands as refuges in bad weather. A solution would be to create smaller reserves in many areas instead of a few bigger ones far from each other. This would also be in the interests of local sportsmen.

We think that reserves in the following areas will be of importance for the continued existence of wintering waterfowl: Delta of the Meriç, Lakes Manyas and Apolyont, delta of the river Kızıl, delta of the Menderes, Hotamis, Lake Hoyran, Lake Beyşehir (south-west area) and areas round Lakes Eber and Karamik. If the creation of one or more of such reserves can be realised, it should be based upon ecological research which should continue after the creation of these refuges, thus ensuring a scientifically sound programme.

Finally, the way in which observations and reports have been made so far is to a certain degree a waste of time and money and is not likely directly and immediately to lead to the results finally desired. Survey of Turkish wetlands, often by foreign experts, on a non-co-ordinated basis and according to different principles, can only with very much

difficulty lead to sound recommendations and effective action. It would be much better to draw up a programme in full consultation with Turkish officials and experts, under which selected wetlands would be intensively studied for a longer time (at least several years). The objectives of international organisations concerned should be to assist Turkish specialists in these studies in every possible way, including the provision of additional manpower to fill any gaps while the problem of training sufficient local experts is being taken in hand.

table 2. The numbers of birds recorded at various wetland sites in western Turkey during January and February 1967

* Present: heard or seen dead (shot by hunters).

No	Name	Date visited	Podiceps cristatus	Podiceps nigricollis	Podiceps ruficollis	Phalacrocorax oarbo	Phalacrocorax pygmaeus	Pelecanus orispus	Ardea cinerea
1	Porto Lagos	10/1	125	-	7	100	400	250	40
2	Meriç valley	11/1	-	-	25	-	55	-	4
3	Bay of Izmir	13/1	200	-	-	-	-	-	-
4	Apolyont Gölü	14/1	15	-	10	1	33	1	1
5	Manyas Gölü	15/1	15	-	-	5	3	-	25
6	Gönen delta	16/1	-	-	-	2	-	-	1
7	Koçabas delta	16/1	3	-	4	1	-	-	2
8	Yesil Irmak delta	22-4/1	31	-	38	-	-	-	11
9	Kızıl Irmak delta	25-7/1	290	600	-	10	-	6	40
10	Kuru Gölü	29/1	-	-	-	-	-	-	-
11	Karamik Gölü	31/1	-	-	-	7	1	-	-
12	Eber Gölü	1-2/2	-	-	-	-	55	-	5
13	Akşehir Gölü	2-3/2	-	-	-	-	-	-	-
14	Çavuşçu Gölü	3/2	-	-	-	-	-	-	-
15	Hotamiş Marsh.	4-5/2	-	-	-	-	-	-	-
16	Suğla Gölü	6/2	-	-	-	-	-	-	-
17	Beyşehir Gölü	7-8/2	190	52	-	-	-	-	3
18	Eğridir Gölü	9/2	-	150	-	-	10	-	2
19	Burdur Gölü	11/2	20	50	-	-	-	-	-
20	Acigöl	12/2	-	-	-	-	-	-	-
21	Menderes delta	14-7/2	3500	-	14	1500	80	230	-
22	Iznic Gölü	18/2	5	-	-	-	-	-	-

Table 2 continued

bite no.	<i>Egretta garzetta</i>	<i>Egretta alba</i>	<i>Anas platyrhynchos</i>	<i>Anas crecca</i>	<i>Anas strepera</i>	<i>Anas penelope</i>	<i>Anas acuta</i>	<i>Anas clypeata</i>	<i>Netta rufina</i>	<i>Aythya fuligula</i>	<i>Aythya ferina</i>
1	-	500	3500	12000	-	200	-	150	-	-	200
2	-	25	2000	700	-	-	-	5	-	-	-
3	6	-	250	-	-	-	-	-	-	-	3000
4	-	2	350	-	-	60	-	-	1	600	1100
5	-	35	600	150	-	-	10	100	-	15	-
6	-	1	-	60	-	-	-	-	-	-	-
7	-	-	1500	100	-	400	30	20	-	-	-
8	1	13	12000	2000	-	2200	*	-	-	2000	-
9	-	215	40000	6000	2	3000	3000	8000	1	90	200
10	-	-	22	-	-	-	-	-	-	-	-
11	-	-	2000	1500	2	1000	4000	1500	5	1	-
12	-	15	4200	-	3	10000	600	600	60	20	-
13	-	-	21	-	-	-	2	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-
15	-	4	2000	800	1	800	800	-	2	-	-
16	-	-	1000	500	-	*	3500	-	-	-	-
17	-	3	4100	1000	-	9000	1250	200	500	1	670
18	-	1	300	12000	200	2000	4	400	250	1000	2000
19	-	-	180	600	-	2000	-	-	-	1100	3500
20	-	-	250	-	-	-	-	-	-	-	-
21	1	2	42000	45000	-	105000	60000	23000	3000	-	22000
22	-	-	650	-	-	-	-	-	-	-	-

Table 2 continued

Site no.	Tadorna ferruginea	Anser anser	Anser albifrons	Rallus aquaticus	Gallinula chloropus	Fulica atra	Vanellus vanellus	Capella gallingao	Numenius arguata	Tringa totanus	Phylomachus pugnax
1	-	-	60	-	-	10000	1500	-	-	4	3
2	-	-	250	-	-	23000	2000	90	2	-	-
3	-	-	-	-	-	15000	-	-	100	-	-
4	3	-	-	-	4	2000	-	-	-	-	-
5	-	-	300	*	2	5000	10	2	*	-	-
6	-	-	320	-	-	30	120	100	3	40	-
7	-	2	3000	3	-	100	300	50	200	150	-
8	-	80	300	-	1	30	30	30	-	-	-
9	-	5000	*	*	-	300	100	15	500	*	-
10	6	-	-	-	-	-	-	1	-	2	-
11	-	60	-	-	-	8000	-	12	-	-	-
12	70	60	17500	*	-	10000	-	2	-	5	-
13	-	-	400	-	-	3000	6	-	-	-	-
14	-	-	300	-	-	50	-	-	-	-	-
15	40	1500	200	-	-	200	-	20	-	30	6
16	50	-	300	-	-	-	2	-	-	-	-
17	41	-	100	-	-	30000	-	*	-	31	-
18	1750	60	4000	-	-	8000	14	*	-	*	-
19	250	-	3000	-	10000	100	15	20	-	40	-
20	126	-	20	-	-	-	-	-	-	*	-
21	54	-	60	*	-	20000	3000	20	650	135	2
22	-	-	-	-	-	200	-	-	-	-	-

NOTES ON SOME WESTERN ANATOLIAN WETLANDS IN SPRING AND SUMMER

- by -

Richard Porter

The following notes on some of the major wetland areas in Western Turkey are compiled from the records of two expeditions made there in the Spring and Summer of 1966 by M.J. Helps, A.R. Kitson, I.E. Willis and myself and in 1967 by A.R. Kitson and myself. During these two years we spent a total of five and a half months studying the distribution of the breeding birds and the spring migration, concentrating our activities on lake and wetland areas.

During the breeding season much of Turkey is rather dry and the lakes, rivers and their surroundings provide "oases" for many species of birds. The abundance of bird life in such areas is very apparent and by western European standards they are remarkably unspoilt. Turkey certainly has few rivals with such a wealth of wildlife supported by its wetlands and for this reason they formed the main study areas of our expeditions.

Here as in many other places lakes tend to be the first areas to become affected by the presence of man. Water is his greatest need. An abundant supply means fertile land, fish to eat, healthy cattle and often large areas of reeds which can be cut to provide roofs for houses or mats for floors. Thus in a wetland area man clashes strongly with nature, modifying the natural habitat by cutting reeds, allowing cattle to graze and water, and by his very presence; villages spring up very rapidly around a lake. As the habitat becomes modified, the numbers and species of plants, birds and other animals are inevitably affected, some perhaps disappearing for ever. In this paper I have aimed at listing the more important lakes we visited and indicating, in particular, the way in which man is affecting the bird populations.

Manyas Gölü:

In the two seasons spent at and around this lake, over 185 species were recorded, of which over 90 were breeding. Apart from over 2,500 pairs of 'herons' nesting in the willow trees that grow in the lake, some of the other more spectacular birds included flocks of up to 100 Red-footed Falcons in May, parties of 500 White Pelicans on migration, Dalmatian Pelicans nesting (one of the only areas they do so in Turkey), at least 10 breeding pairs of Spur-winged Plovers, as well as Marsh Harriers, Long-eared Owls, Great Reed and Savi's Warblers and Penduline Tits. Large flocks of White Storks and many birds of prey were seen travelling north on spring migration. In the surrounding fields and scrubland were breeding Rollers, Bee-eaters, Great-spotted Cuckoos, Red-backed Shrikes, Wheatears, Olivaceous Warblers, Rufous Bush Chats and Black-headed Buntings, to mention only a few. Very little disturbance from reed-cutting was observed. Fishermen, however, frequently disturbed nesting colonies by rowing through them or, worse, mooring their boats nearby, thus preventing the birds from returning to their nests for long periods. Fortunately, however, there are several groups of trees scattered around the lake, and we found that if birds are continually disturbed they can usually find another site

to which they move. On the southern edge of the lake, in particular, agricultural development is rapidly expanding. In 1967, several of the good sandy areas where in the previous year Common Terns and Spur-winged and Kentish Plovers were nesting, had been reclaimed for the growing of crops.

Apolyont Gölü:

The most important areas for birds on this lake are the reeds and large lily beds that grow along the western and north-western shores, and the delta of the River Kemalpaşa, that flows into the south-western corner. The lily-beds provide ideal nesting sites for Whiskered and Black Terns, whilst the reeds hold nesting grebes, Purple Herons, Little Bitterns and Ferruginous Ducks. Small 'fleets' of outboard motor boats were seen on every visit to the lake, and, as they tend to do most of their fishing along the edge of the reeds and lilies, they doubtless disturb the nesting birds. On one occasion a powered boat was seen to drive right through a lily bed on which Whiskered Terns were starting to nest. This disturbance gave cause for concern since this was the only area where we found this species breeding.

The delta of the River Kemalpaşa consists of a flat expanse of mud covering an area of at least 4 sq. km. and all the time increasing as the silting up of the river mouth continues. On this mud grow mixed willows and tamarisks, very dense in places, as well as small patches of reeds. Much of the mud, however, remains free of vegetation, forming open expanses and spits that run into the lake. Cattle were being grazed in the area and obviously disturbed the nesting birds, which included 55 pairs of Spur-winged Plover, 15 pairs of Black-winged Stilt, and 10 pairs of Stone Curlew, as well as Little Ringed and Kentish Plovers, Common Terns, Little Terns, Short-toed Larks and Black-headed Wagtails. As the year progressed and the mud dried, much of the area was ploughed for crops. This may well be an important control on the tamarisks and other vegetation, which could otherwise choke the area completely and eliminate nesting sites for plovers.

The mud-flats are excellent habitat for migrant wading birds. Large numbers of Ruff, Redshank and Little Stints, as well as 1,200 White Pelicans, several parties of Pygmy Cormorants, Spoonbills and Little Egrets were seen in the Spring and on the single visit made in the Autumn.

Izник Gölü:

There are some excellent reed beds and marshes on the northern and eastern edges of this lake as well as ideal sandy stretches for migrant waders. This is very much a tourists' lake, particularly at the eastern end where the walled town of Iznik attracts many visitors. Large numbers of Little Bitterns, Squacco Herons and Ruddy Shelduck were nesting and almost certainly also Night Herons. Though the actual colony of this latter species was not located, 150 birds including many young were seen on a July visit in 1966. Much reed cutting was noted.

Arapçiftliği & Dalyan Gölü:

These two lakes lie one on either side of the mouth of the

River Koca that drains from Apolyont into the Sea of Marmara. In the comparatively small area of the lakes we observed the most representative cross-section of habitats found in Western Anatolia. From the sea southwards one finds (a) open sand dunes, (b) sand dunes with cover of tamarisks, (c) lakeside vegetation of reeds and sedges, (d) dried mudflats, (e) open water, (f) open fields for grazing cattle and (g) scrub and tree covered hills. In addition at the western end of Dalyan Gölü is the most important habitat of the region - a large area of wet woodland with oaks and other deciduous trees up to about 40 feet high, with a secondary layer of much thick bramble and scrub. Many of the trees are rotting and there are several small stretches of open water inside the wood. This habitat appears to be very little disturbed, except by cattle and sheep using the paths that traverse it, and it was quite unique among all we saw in western Turkey, with the highest density of birds. Thus on a transect made of about 4 km. of the woodland and bordering scrub on 19 May 1967, a total of 53 species was recorded; among the more interesting were Nightingale (88 contacts), Turtle Dove (54), Chaffinch (38), Olivaceous Warbler (46), Golden Oriole (19), Cetti's Warbler (26), Red-backed Shrike (151), Hoopoe (13), Long-tailed Tit (16), Olive-Tree Warbler (9), White-backed Woodpecker (4), Roller (6), Masked Shrike (2), and River Warbler (1). Honey Buzzards and Lesser Spotted Eagles were seen displaying and were almost certainly nesting in the woods.

On the lakes themselves and their sandy, sedge and tamarisk-scattered shores, breeding species included Pratincoles (30 - 40 pairs), Black-winged Stilts, Ruddy Shelducks, Stone Curlews, Kentish Plovers and at least one pair of Oyster Catchers. Unusual species recorded on passage included Whooper Swan, Common Scoter, Dotterel and Broad-billed Sandpiper. Unfortunately the Pratincoles and other species, such as Short-toed Larks, Tawny Pipits and Black-headed Wagtails, which nest in the sandy areas, are subjected to a great deal of disturbance from grazing cattle; hardly a scrap of ground could be found that was not criss-crossed with hoof marks. There was also occasional shooting, even in April and May, when we saw two Turtle Doves and a Gadwall killed.

Marmara Gölü:

Very little disturbance was noted on this lake due primarily to the vast areas of tamarisks and sedges that grow along the edge of the lake and well out into the water, making access very difficult. This also made counting difficult, but Purple Herons and Little Bitterns were certainly numerous and Pratincoles, Black-winged Stilts, Spur-winged Plovers, Little Ringed Plovers and large numbers of Penduline Tits were also breeding. The lake is very important for migrant waders, 40 Wood Sandpipers and 60 Green Sandpipers being noted in 1966 as early as 1 July.

Demirköprü Barajı:

A man-made reservoir built by the damming of a river valley. There was very little suitable habitat for nesting water birds, though we found Dalmatian Pelicans and Cormorants present, probably

using the area as a feeding ground. There are several such reservoirs in Turkey and many more are, I understand, under construction. It is to be hoped that they may be planned to allow for the growing of willows and reeds as nesting sites for water birds, as well as the more usual winter refuge for wildfowl which such reservoirs often provide elsewhere.

Acigöl:

A semi-salt lake lying in a region of rather high mountains and rock faces. Flamingoes can be frequently observed feeding on this lake, but we saw none on a brief visit in April 1967. Very few other water birds were seen on this visit and for some reason the area does not seem to be attractive to nesting species.

Eber & Aksehir Gölü:

Lying in a long flat valley between the mountains of Emirdag and Sultandağlar, these two lakes are virtually one huge area of phragmites reed. The density and number of species using the reed-beds for breeding was very high, in fact higher than any other reed-bed area studied. The dominant species were Eastern Thick-billed Reed Bunting, Great Reed, Savi's and Moustached Warblers, Bearded Tits, Water Rails and Black Terns. We also found Red-necked Grebes, Marbled Teal, flocks of White-headed Ducks (up to 125) and numerous species of 'herons' including Great White Heron, Little Egret and Pygmy Cormorants, which were obviously nesting in the dense reeds.

The reeds are heavily exploited, but cutting is probably very important in providing a suitable and not too dense habitat for nesting birds. It is, however, a pity that harvesting tends to be carried out as late in the year as May, when many birds are well under way with their nesting activities. It is possible too that if a few areas of reed-bed could be set aside and reserved from exploitation, it would serve a useful purpose in providing suitable sites of dense vegetation for the 'nesting-platforms of herons.

The flooded fields around the lakes were ideal for migrant waders and in April 1967 up to 2,000 Ruff were using them. The valley in which the lakes lie is obviously a very important route for migrating birds of prey and storks and large westerly movements were observed in April and May 1967. These lakes are very popular for hunting and fishing and are visited for that purpose by sportsmen from Ankara and further afield and even from abroad.

Hamam:

A small area of salt flats adjoining a small shallow lake, some 15 km. west of Eber Gölü. Unfortunately this area was very much disturbed by cattle. Pratincoles, Redshank, Lapwing, Avocets and Kentish Plovers were attempting to breed and the last-named species was seen with young on 6 May 1967, which in view of the continual trampling over the ground by cattle seemed a remarkable achievement.

Lakes of the Ankara region and marsh near Sivrihisar:

As well as the small lake and marsh near Sivrihisar, two lakes at Ankara, those of Moğan and Çübük, were visited in April and May, 1967. These lakes being rather isolated wetlands in the dry and rather inhospitable Ankara plateau, attract many birds particularly migrants. Unfortunately except for Sivrihisar they offer little in the way of suitable habitat for birds to nest. The lakes are said to be very popular for shooting.

Karamik Gölü:

Reed-cutting and egg-collecting were in progress when this lake was visited in May 1967. The eggs we saw being taken were those of Coots and Grebes and apparently used for food. Much of the lake edge consists of flat wet fields on which cattle are grazed, but there are some excellent reed beds, particularly along the eastern shore. Interesting species that were almost certainly nesting included Mute Swans (50), Grey Lag Geese (40), Mallard, Red-crested Pochard, Ferruginous Duck, Garganey, good numbers of Great White, Purple and Squacco Herons and 20 Spoonbills. This last record is of interest as our only one for the species outside the Manyas area. The wet fields around the shore held many hundred migrant Ruff and several Spotted Redshank.

Bafa Gölü (and the River Menderes):

A beautiful lake set amongst a background of high mountainous crags of Mount Latmus and lying next to the River Menderes. The most important habitat on the lake is the flat, sandy western edge with several reed beds lying off-shore. Many waders were nesting in this area including Spur-winged and Kentish Plovers, Black-winged Stilts and probably Redshank. Breeding ducks included Ruddy Shelducks. The number of birds nesting is certainly affected by disturbance from villagers and grazing cattle.

A census was carried out along about 3 km. of the neighbouring River Menderes in June 1966. Here we found no fewer than four pairs of Pied Kingfishers and one pair of Smyrna Kingfishers. The Penduline Tit was very numerous. In the evening roosting movements of herons were seen; the birds flying west to the mouth of the river, which lies 8 km. from Bafa Gölü. This is obviously a very important nesting area but unfortunately time did not allow us to visit it. In the distance, out on the delta, we noticed that a huge embankment was under construction, presumably as a flood-control measure.

Rivers along the Mediterranean Coast between Antalya and Alanya:

On a three-day visit to this stretch of coast in April 1967, we found the trees and bushes bordering these relatively undisturbed rivers to be full of migrating birds. A stretch of not more than 15 km. of four rivers visited produced two pairs of the very beautiful Smyrna Kingfisher.

Beyşehir Gölü:

The two most important areas for breeding water birds on this, Turkey's third largest, lake are the reed beds of the southern end and

the tamarisk and reed area of the north-eastern shore. There was much disturbance from shooting, even in May, and we found or were shown dead a Shelduck, White Stork, Purple Heron, 2 Little Bitterns, 3 Coots, a Ferruginous Suck and 6 Spanish Sparrows. The only other disturbance noted was reed cutting, which appeared to be rather drastic Judging by the sparseness of much of the reed beds. Important breeding species present at this lake were Great White, Purple and Squacco Herons, Little Egrets, Common Terns and several species of duck including ferruginous Duck and Gadwall.

Conclusion:

The richness of the bird life in the lake areas briefly reviewed in this Paper and their neighbouring countryside, is reflected by the fact that, during our two expeditions to western Turkey, covering a period of 9½ months, a total of 301 species of bird were observed.

We would like to express our thanks to the Wildlife & National Parks Department who allowed us to camp at the Bird Reserve at Lake Manyas, and to the Reserve's excellent warden, Ali Kizilay, and his son Mehmet who so admirably looked after all our needs. Turkey is indeed lucky in having such a fine warden for its first bird reserve.

WETLANDS AND WILDFOWL IN SOOTH CENTRAL TURKEY

- by -

Amotz Zahavi

Editorial Note:

This paper is a summary of a report to the International Wildfowl Research Bureau of a wildfowl census carried out in the Adana-Antakya area during January 1967, which has been prepared by kind permission of the I.W.R.B. and of the author.

At the request of International Wildfowl Research Bureau, the Tel-Aviv University granted leave and funds for three of its staff, the writer, Zohar Zuk-Rimon and Uri Harder, together with Igal Sela, Chief Warden for the Society for the Protection of Nature in Israel, to carry out a mid-winter wildfowl census in the Adana-Antakya area from 19 to 27 January 1967. The census was carried out with the co-operation of the Department of National Parks of the Forestry Service of the Turkish Government. The Head of the Department Mr. Zekâi Bayer and his deputy Mr. Mahmut Molu organised the programme and Mr. Halil Demirel of the Forestry service in the Adana region accompanied the team throughout its work. We were also much indebted to Mr. Mesut Can, head of the regional government, without whose support we could not have carried out the programme. Much information about habitats, waterfowl and hunting was collected for this report by various members of the Forestry service, and especially by Mr. Demirel and Mr. Ferit Ozdel, deputy director of the Department, who took an active interest in the survey and joined the team in the field for a few days. To them and to all the many others who assisted us, our grateful thanks are due.

Most observations were made in the coastal area between Silifke and Iskenderun and in the Rift Valley from the Amik Gölü near Antakya north to Maraş. Special attention was given to the latter in view of the reclamation work in progress: it was the richest area seen during the survey, but unfortunately if quick and decisive steps are not taken most of it will be dry within two years. Meanwhile the shooting pressure is very high.

Wildfowl Habitats

1. The river estuaries

The lagoons around these estuaries are very attractive for waterfowl. Some of them like Silifke-west, Yamortalik and Karatas are rich in waterfowl, and had a few tens of thousands of birds each during our visit. Others like Silifke-east were practically bird-less. The precise reasons were not determined and need further research, but we noticed that the richer lagoons were well supplied with submerged vegetation. The existence of feeding-grounds nearby may also influence the abundance of waterfowl, for example the inundated rice-fields north of the Silifke lagoons. These lagoons are used for fish-breeding and are not, as far as we know, threatened by reclamation. Thus the combination of lagoons and rice-fields in the region may be a stable feature of the landscape,

which would promise a good future for the waterfowl.

We might add that Trionyx inhabits the lagoons and that the Green Turtle Chelone breeds in great numbers in their vicinity and its artificial rearing in the lagoons themselves might well be possible: at present the turtles may be approaching extinction, as they are taken in great numbers.

2. The lakes in the Rift Valley

These shallow lakes are situated on fertile soil and all of them are being subjected to reclamation activity. If something is not done, the lake habitat may vanish completely. The lakes were rich with wintering waterfowl during our visit. They are probably also important for migrant birds passing along the Rift Valley from Europe to Africa. Our first impression is that if the reclamation projects were to take this into account and keep 15 - 20% of the lake area under water annually, it could be enough to maintain the larger part of the existing waterfowl and migrant bird populations. The situation needs urgent study in co-operation with the D.S.I. authorities who are responsible for the reclamation project and have all the data and technical know-how necessary to establish some sanctuary areas. If the latter were approved by the Minister of Agriculture, there is no question but that a biologist working with the D.S.I. for a few weeks would be able to plan the sanctuaries.

3. The Adana plain and its winter pools

Many geese spend part of the winter in this area, grazing in the fields: a few thousand of them can do very little damage to the vast stretches of agricultural land and constitute a rich recreational asset for the local people and visitors. A good management policy could ensure the maintenance of the goose stocks and allow a permanent crop to be taken of them. The winter rainpools are also frequented by thousands of surface-feeding duck, which add to the attractiveness of the shooting area.

4. Inas Swamp

This small wetland near Mersin is rich in submerged vegetation. According to the local people it remains wet in summer and is therefore important for conservation of plant life and various small animals dependent on permanent fresh water. We believe that it deserves conservation for scientific reasons: we did not see any other similar habitat in the area and, moreover, the Marbled Teal Anas angustirostris, which winters there, is also reported by fishermen to breed commonly. During our visit we only saw about a score of this rare species and were alarmed to see three of them shot by one hunter. It is a species for which a special breeding sanctuary could well be established, after a survey in the summer and the choice of a suitable area.

Some conclusions

We arrived at a total estimate of some 600,000 wildfowl seen during our short survey. This is probably well below the actual number in the area, as in many places birds were resting far out to sea or in thick

vegetation and could not be counted, while we were unable to visit a few open fresh water areas. What would be best would be for a large number of ornithologists to conduct simultaneous counts all over the area, but for the present it might be more practical for a small two to four-man team, equipped with a 4-wheel drive vehicle and light transportable motor-boat to carry out intensive observations over at least two weeks. The effort of organising this would be considerable, but taking into account the many thousands of local people who enjoy shooting and the importance of waterfowl for sport-shooting in the district, the investment in labour and cost would be well worthwhile and essential for the future maintenance of this asset.

During our survey many hundreds of people were seen with guns. One hunter at Inas returning from hunting with a Kayak had some 20 coots and a few ducks, including three Marbled Teal, but most hunters seem to bag very few birds, especially when they go on foot during the day. Hunting with Kayaks during the day is practised at Amik Gölü, where we saw some 10 boats and the boatmen said they might bag up to 20-30 birds each. But according to the local people most shooting is done by night when from 50 to 100 boats may go out with a lamp attached to the front of the Kayak, though bags claimed were still only 10-20 birds per boat. The number of boats may be an over-estimate and needs further investigation. Shooting of ducks at dawn when they come in from open water to their feeding grounds is also practical, and villagers of a small village on the Silifke plains claimed bags of 20 birds a day. Evening flight shooting was also seen around the Baradan estuary. At present it is therefore difficult to make a good estimate of the total kill of ducks in this area, and it would be very desirable for the Forestry service to make a full investigation by questionnaire through the local officials. Little is known, too, about the pressure of shooting on geese as opposed to duck. Few people we met claimed to shoot many geese and we do not believe that the hunting pressure on geese is heavy in this particular region as compared with areas further north such as the Tuz Gölü. Swans are occasionally shot and we believe that these would merit total protection: we saw only about 30, all in the Silifke region.

Full details are given in our Report of the individual species seen. It may be noted here that we were astonished to find large flocks of flamingoes everywhere (some 19,000 were counted altogether), but could obtain no information about whether any breed locally. Certainly a breeding colony of flamingoes always has a very special value as a tourist attraction. We were alarmed to find the Gadwall Anas strepera to be rare (only 100 seen in the Amik Gölü), as this is a species which appears to have been decreasing very much in Israel in the last 20 years.

Table 3. The numbers of birds recorded at various wetland sites in southern Turkey during January and February 1967.

No.	SITE Name	Date visited	Fulica atra	Anas platyrhynchos	A. crecca	A. strepera	A. penelope	A. acuta
1	Tuz-Gölü, E.side	18.1						
2	Aynas swamp	19.1	5000	+	++		+	++
3	Bardan lagoons	19.1	1500				+	+
4	Karatas west lagoon	20.1	7000		20		2000	
5	Pool 10 km. N. of Karatas	20.1			4000		200	50
6	Tuzla lagoon	20.1						
7	Yumurtalik N.E. lagoon	21.1	7000		+		5000	+
8	H.W. lagoon	21.1	5000				5000	
9	Ceyhan N & W lagoons	21.1	1000		++			++
10	Amik Gölü N.W.floods)	23.1						
11	N.E.floods)	23.1	100000	++	+++	100	+	70000
12	main water)	24.1						
13	Emengölü	25.1			3000			40000
14	Gauurgölü	25.1			++			+
15	Celikgölü	25.1						
16	Silifke E.lagoon	27.1						
17	Silifke west lagoon E.side	27.1		+	+			+++
18	W.side	27.1		+	+		1500	+++
19	N.side	27.1		+	+++		+	+
20	rice fields	27.1	2000	+	+			+

Table 3 continued

bite No.	A. clypeata	A. angustirostris	Netta rufina	A. fuligula	A. ferina	A. nyroca	Tadorna tadorna	T. ferruginea	Cygnus olor	Unidentified birds	TOTAL
1							200				200
2	+	20	++		+						8000
3										50000	50000
4								120			9000
5	50										4300
6							50			50000	50000
7					+						15000
8								40			10000
9	++			++	++						2000
10											
11	+++	a few	7000	+	40000	+					255000
12											
13											43000
14	+									15000	15000
15										2000	2000
16					50						50
17	+				+++				30		30000
18					+						10000
19											20000
20								1000			5000

Index: + = a few birds identified
 ++ = hundreds were identified
 +++ = thousands were identified

OBSERVATIONS ON THE WETLAND AND WILDFOWL

SITUATION IN EASTERN TURKEY

by

J. Vielliard

The extension of the MAR Project to the Middle East region needs a big programme of ornithological research to determine ecological values of all the different wetlands. This task was begun this year, 1967, by survey-work in Turkey carried out by two missions on behalf of IWRB. The first, which took place during the winter, was undertaken by Dr. Szijj and Mr. Hoekstra and is reported in their contribution for this Meeting. The second has been undertaken during the summer and autumn and was entrusted to Mr. Kowalski, Mr. Le Maho and myself by the Director of IWRB and co-ordinator of the MAR Project, Dr. Hoffmann, to whom our thanks are due.

The choice of Turkey as a starting point for the extension of the MAR Project has been very fortunate for two reasons : first and foremost because of the support and interest being taken by the Turkish Government in nature conservation and all the great help given to us by the General Directorate of Forests, for which I would express special thanks to Mr. Zêkai Bayer and Mr. Mahmut Molu; secondly, for scientific reasons because of the geographic position of Anatolia as a bridge between south-eastern Europe and the Middle East. So our first aim has been to get urgent information on Turkish wetlands and test the aims and methods of the Project in the field, while the purpose of this preliminary report is to review results to date, illustrating each point but not attempting in this short paper to go into all the details. The main points with which I wish to deal are headed Avifaunal, Wildfowl migrations, Wildfowl counts, General ecology of wetlands and Protection.

Avifaunal

Observations under this head are an important first step in obtaining an assessment of the biocenoses. In eastern Anatolia many new discoveries have been made during our investigations : for example the re-discovery of Prunella ocularis in this region, an extension of the range of Passer moabiticus about 100 km. N.W., the discovery of the first breeding colony of Pelecanus onocrotalus known in Turkey, new observations on Rhodopechys obsoleta , and numerous new localities for various species, e.g. Cettia cetti at high altitude, Phalacrocorax aristotelis in the inner eastern Anatolian lakes. All these have given valuable biogeographic and ecological indications.

To give just one example of the usefulness of these simple avifaunal observations, the breeding of Melanitta fusca had been reported in Soviet Armenia by Satunin, but without absolute proof Was considered by some subsequent writers to be a very unlikely record; however, I have found several instances of the nesting of this species in two eastern Anatolian lakes, the crater-lake of Nemrut (2,400 m. a.s.l.) and Lake Balık (2,240 m.) It is hardly necessary to stress the great biogeographic importance of this fact, which is particularly interesting, showing as it does high altitude taking the place of high

latitude, and this for a strictly aquatic bird. Another deduction from the observation is important from a practical point of view ; the Melanitta fusca observed on the two lakes, in August and September, were females with young birds, which from their size suggested an approximate laying-date about 10 July. At the same time large numbers of males were seen on other lakes at lower altitude and also along some of the shores of the Black Sea. The latter might belong to a more northern breeding population, but the others must be considered as belonging to the high altitude breeding populations. Thus if these Turkish wetlands over 2,000 m. high had not been investigated, the gathering of males in the lower lakes would not have been properly understood. For these reasons comprehensive ornithological surveys are in my view an essential prerequisite of the extension of the MAR Project.

wildfowl Migrations

It is essential to have a very good knowledge of the movements of wildfowl populations if efficient international control is to be achieved. To provide a sound basis for the solution of a complex problem is one of the main reasons for the MAR Project and its extension to the Middle East. It is quite obvious that the results obtained, to date, although very interesting, do not allow definite conclusions to be made. The geographical situation of the Middle East makes it a cross-roads through which numerous and various migrant populations pass. To determine the migrations of Anatidae in the region accurately, it is necessary to investigate each of the northern Palaearctic breeding populations, especially as those with a westerly and those with an easterly range come to the parting of the ways when they pass through the Middle East. This fact was brought home to me by the results of ringing Platalea l. leucorodia at a few breeding colonies in the Black Sea/Caspian area. These Pontine-Caspian populations have produced ringing recoveries both in the Indus basin and the Kile Valley. The complete elucidation of these migrations will require long study, but it is urgent to arrive at a sound general view.

Because of the variety of species, their ecological requirements and their migratory behaviour, the Laro-limicolae provide better material than the Anatidae for obtaining valuable biogeographical and ecological indications. In Turkey my observations on such Asiatic or Afro-asiatic species as Chettusia gregaria, Charadrius leschenaulti and Ch. asiaticus suggest a regular tendency to wander to Anatolia. Several other species seen by me and previously regarded as accidental in Turkey are also probably more or less regular migrants - e.g. Squatarola squatarola, Arenaria interpres, Limosa lapponica, Tringa terek, Limicola falcinellus and Stercorarius pomarinus. It was also great luck to find a Stbercorarius skua on Lake Van, the first record for Turkey, though we know that it is a species which is quite capable of crossing continents and mountains. Unfortunately it is not possible here to discuss these observations in greater detail.

Wildfowl Counts

Only a few remarks on the subject can be made pending the collation of the figures obtained on our survey. Two specially important species are Casarca ferruginea and Oxyura leucocephala, since their status in Europe is threatened, though better further east as shown by the IWRB surveys in Turkey, and Mr. Savage in Iran and West Pakistan. Much more information is needed on game species of Anas and Anser. The long-term

studies should begin with extensive prospecting surveys. In my experience two lakes quite close to one another in this region, or even two different parts of the same lake, can have very different wildfowl populations. After the initial prospecting it should be possible to limit research to a few representative places, but it is quite clear that the wildfowl of so varied a country as Turkey, not to mention the other neighbouring countries of the Middle East, cannot be properly assessed by extrapolation from the study of a particular wetland.

General Ecology of Wetlands

During ornithological survey work, a quick though no doubt superficial idea can be obtained of the general ecology of a site. At least it allows one to decide on which are the more important places scientifically, which need special protection measures and which are the more representative of the country being studied. Thus for Turkey, east of Ankara, my preliminary assessment is as follows :-

A. Black Sea : the wetlands are limited to the sea shores in the deltas of the Yeşil and Kızıl, respectively east and west of Samsun. The former is however tending to decrease in area and the latter may suffer the same fate unless special measures are taken to preserve its exceptional value for the Anatidae, as has already been reported by Or. Szijj and Mr. Hoekstra.

B. Central Uplands : all the Central highland salt lakes with their sparse vegetation are very good for some species including many migrant Anas spp. The breeding birds are very vulnerable, but, it would be easy to give some colonies protection, especially those of the small Lake Kulu.

Mediterranean coast : this area proved rather disappointing, but perhaps we were unlucky with our observations except at the great lagoon in the delta of the Gökusu near Silifke. This lagoon has an excellent avifauna, with many rare species including breeding Anas angustirostris. It does not seem to be in danger at present.

D. Hatay : this is one part of the country where the future of wetlands is extremely doubtful. The famous lake of Antakya is disappearing because of drainage and cultivation, and the results of this process could be disastrous for the hydrological balance, already rather precarious, of the Hatay region. The situation of Lake Gavur, south of Maraş, is similar, but more tragic. This lake also plays an important part as a hydrological regulator and occupies a very interesting position on the borders of the Hatay, south-east Anatolia and east-central Anatolia. It was visited by the British ornithologist Danford at the end of January 1879, and as far as we know never again by any ornithologist till Kowalski and I visited it at the end of July 1967. These somewhat widely spaced visits have given data of exceptional scientific interest and it is unfortunate that, in view of the drainage work we saw in progress, a third successful visit may never be made.

E. Eastern Anatolia : this area which was our main target has had few visits due to the difficulty of travel. Our survey, made possible with the help of the Turkish Directorate of Forestry, was rich in results, but would certainly have benefited if much more time had been available. The immense size of the country, difficulty of communications and great number of wetlands did not favour trying to get really reliable results on a quick journey. Moreover, we found among the lakes an extraordinary variety of biotopes with extremely different avifaunas. We saw little sign of wetland destruction at present, but eventually it is likely that some protective measures will be necessary, which will be difficult to work out and apply in practice because of the variety and dispersion of these east Anatolian wetlands. It will certainly be necessary to carry out a survey in every wetland which is being considered for a development project that could threaten its existence.

Protection

Finally, as a result of our researches, it has been apparent that the measures of protection and management which are needed for the purposes which we wish to pursue can readily be identified. The survey also showed that another important problem is that of effectiveness of the hunting law, the best way to bring necessary information to hunters, public and authorities. It is to be hoped, however, that this brief interim report will help in the elaboration of the MAR Project programme in the Middle East. The ornithological and ecological research opportunities are quite exceptional and if this Technical Meeting results in more of them being taken up it will have served a most useful purpose.

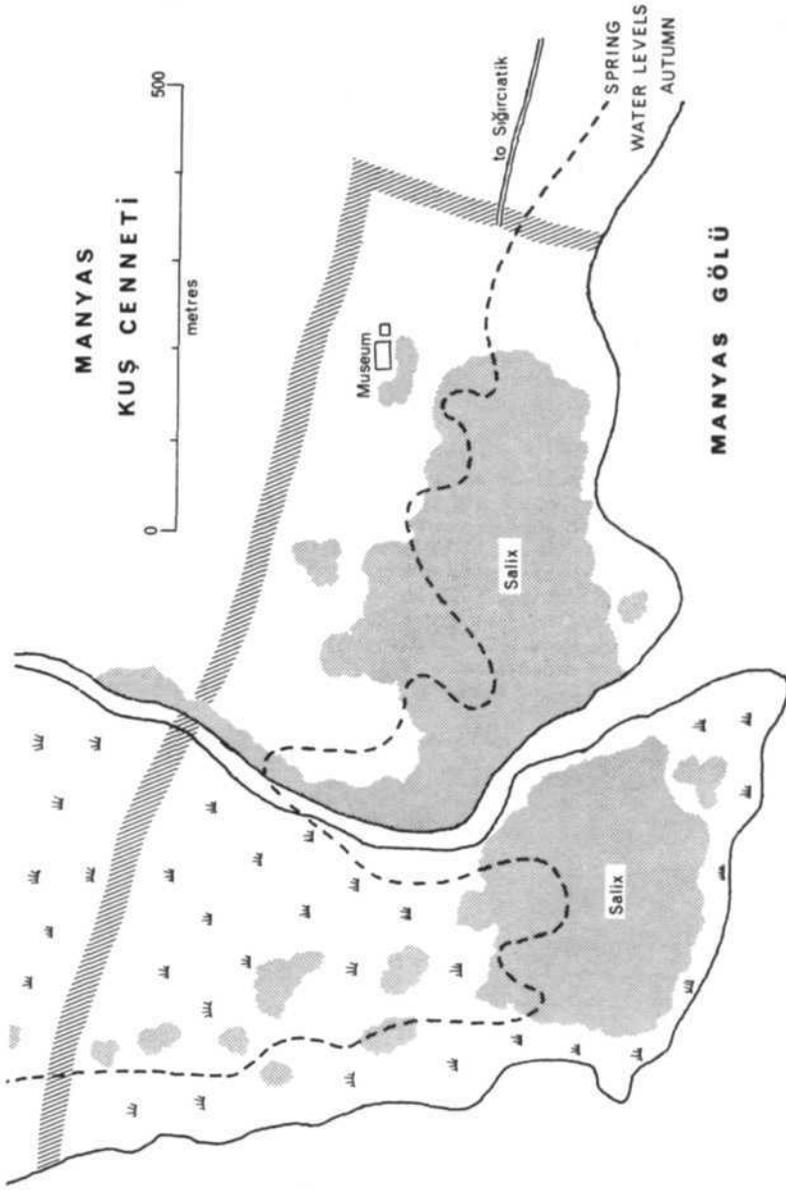


Fig. 3 . The Manyas Bird Paradise National Park.

(c) Lake Manyas Bird Sanctuary National Park

GENERAL REVIEW OF THE LAKE MANYAS SANCTUARY
AND ITS ENVIRONMENT

- by -

Tansu Gürpınar

The locality known as the Kuş Cenneti was discovered by Prof. Dr. C. Kosswig and his wife on 1 April 1938. They had come to Lake Manyas to fish when they found the bird colonies in the willow woods and, being greatly impressed by what they saw, named the place 'Vogelparadies', the 'Bird Paradise' or Kuş Cenneti

As a result of Prof. Kosswig's activities the nesting colonies became known to nature lovers and, thanks to the many visitors, their value became better understood. The preservation of the colonies was based on the Professor's personal interest in his capacity as Director of the Zoological Institute of Istanbul and on his efforts to convince the local villagers of Sığırçı Atik of the importance of the area. Unfortunately when he and his wife returned there after the Second World War, they found that considerable damage had been done to the nesting colonies, the birds having been scared away by the peasants who claimed that they were destroying the leaves of the willows in the shade of which they had become accustomed to holding the Village Fair. However, when it was explained that the loss of leaves was due to a small worm of the genus Hyponomeuta. the disturbance of the nests was successfully stopped.

In 1952, a field station of the Istanbul University Hydrobiological Research Institute was established nearby and the guardian of the Station was also given the duty of guarding the Kuş Cenneti. It still did not have the official status which many people advocated, but at last in 1959 it was classified as a National Park by a Cabinet decision and was placed under the care of the General Directorate of Forests. More effective protection now became possible and the nesting sites were improved by the planting of new trees.

At the present time there are two buildings at the site, a two-storeyed building used for a museum and laboratory and for accommodation for visiting ornithologists and a house for the warden which also has store-rooms for keeping boats, fishing-nets and other equipment. There are still some problems arising in the application of the development plan for the area, prepared under the direction of the responsible Government office. But discussion with experts continues although a start has been made with the implementation of the plan.

General description of the area:

Lake Manyas is the furthest west of four lakes situated in the Marmara region and the Kuş Cenneti is located on its north-east shore. It is approached by a 3 km. branch road from km. 15 on the

Bandırma-Balıkesir road. The National Park occupies 52 km. out of the 162 sq. km. of the Lake, which is 15 m. above sea level and has a maximum depth of 10 m.

The Marmara lake region has a mild climate, with an annual mean temperature of 14° C. Rainfall averages 638 mm. and occurs mainly in autumn, winter and spring, and the mean relative humidity is 70%. The lake dries back about 200 metres from April through the summer.

Some geological formations in the vicinity of the Lake date from the Neocene, but the lake itself dates from the fourth period of the Pleistocene, prior to which all the Marmara lakes were bays associated with the Black Sea system. This has had the interesting result, from the standpoint of the fish fauna, that some salt water species have been able to adapt themselves to the new fresh water conditions. Limnologically the lake is of an argilotrophic type, sufficiently shallow for wave action to reach the lake bed. This, taken together with the rich supply of plankton, results in the water always being cloudy.

In general, conditions in the lake are favourable for many different organisms. Of the Crustacea, the crayfish Potamobius fluviatilis is found and caught in abundance along the shores, where Bufo vulgaris and viridis, Rana agilis and other Amphibia are also always present. The common reptile is Tropidonotus natrix and the lake is very rich in fish species, the most important being Cyprinus carpio, Silurus glanis, Esox lucius, Leuciscus cephalus (the four used by the commercial fisheries), Vimba vimba, Rutilus rutilus, Rhodeus serevicesus and Scardinius erythrophthalmus.

The surroundings of the lake and especially the areas from which water recedes in the summer have a very rich vegetation. Groups of Salix nigra occur along the shores and are much used by nesting birds, Tamarix occupies large areas on the south-east and there are a few Populus. The water vegetation is mainly Typha, Scirpus, Juncus and Phragmites, with Nymphaea alba around the Phragmites clumps. The water recession in early summer is followed first by a flush of Cyperus longus. Large quantities of Digitaria paspaloides, Datura and Lythum salicaria occur and among them, more sparsely, Oplismenus crus, Althaea, Polygonum, Anthemis, Mentha, Lycopus europaeus, Bidens tripartitus etc.

Birds of the Kus Cenneti

Trees and reed-beds constitute the two main habitats for birds, of which large numbers come to nest in the period between the beginning of February and mid-July. It is the variety of food-supplies and nesting sites which is responsible for the exceptional colonies. Outside the breeding season the numbers of birds are fewer, though at least fifteen species are found and the lake is on the migration route of many species, of which the Anatidae are the most important.

The twenty main breeding species, most of which only remain for four or five months, are:-

Cormorant Phalacrocorax carbo.

Pygmy Cormorant Phalacrocorax
pygmaeus.

Heron <u>Ardea cinerea</u> .	Purple heron <u>Ardea purpurea</u> .
Night Heron <u>N. nycticorax</u> .	Little Egret <u>Egretta garzetta</u> .
Squacco <u>Ardeola ralloides</u> .	Little Bittern <u>Ixobrychus minutus</u> .
Spoonbill <u>Platalea leucorodia</u> .	Mallard <u>Anas platyrhynchos</u> .
Gadwall <u>Anas strepera</u> .	Black Kite <u>Milvus milvus</u> .
Turtle Dove <u>Streptopelia turtur</u> .	Scops owl <u>Otus scops</u> .
Roller <u>Coracias garrulus</u> .	Reed warbler <u>Acrocephalus scirpaceus</u> .
Great Reed Warbler <u>Acrocephalus arundinaceus</u> .	Spanish sparrow <u>Passer hispaniolensis</u> .
Grow Gorvus cornix.	Jackdaw <u>Corvus monedula</u> .

The main nesting habitats can be classified as follows:-

1. Mature tall willows, standing in water for part of the year.
2. Young willows, in densely-branched thickets, also in water for part of the time.
3. Reed-beds growing in water or on boggy ground.
4. Sedge and grass growing where the water has receded.
5. Sandy beaches, free of vegetation.
6. Sandy soils mainly supporting tamarisk.

Of these habitats only 1, 2 and 4 are found in the National Park itself, the others occurring mainly on the south and south-east shores of the lake and frequented by a number of species of birds rarely seen in the National Park, such as Pelecanus crispus and onocrotalus, Plegadis falcinellus, Himantopus himantopus and various species of terns of the genera Chlidonias and Sterna, as well as by quite large numbers of various species found in the Kuş Cenneti.

Purposes and problems of the National Park

The Kuş Cenneti is the first bird reserve in Turkey and the main purposes of its creation can be said to be (a) educational - to arouse curiosity, interest and finally love of birds among the people; and (b) scientific - to use the area for ornithological and ecological research. Since it was first discovered, much has been published about the area and all agree that its ornithological value is quite exceptional and that it definitely needs to be protected if it is to continue and flourish. At present this protection is available within the National Park boundaries, but there are still some problems to be solved.

As has been pointed out above, the breeding colonies are by no means confined to the National Park, but are to be found also on the south and south-east of the lake where all the different kinds of habitat occur and the breeding birds are therefore important and interesting. In fact very nearly the whole of the Lake Manyas shores and surrounding fields and grassland are used for nesting or feeding, and of course over much of this area agriculture, fishing and shooting are steadily increasing. Hence the big problem is to keep the birds reasonably free from disturbance, at least during the breeding season. Some suggestions which can be made for solving this problem are:-

1. to extend the National Park boundary westerwards up to the end of the reed-beds;
2. to establish a buffer zone about 200 metres wide round the whole Park, where hunting, fishing and other activities likely to harm the birds would be forbidden;
3. to increase the number of wardens and to provide facilities so that visitors can see the birds without disturbing them. This undisturbed area, where peace and quiet are maintained, should be at least 100 hectares, big enough to ensure that, if breeding colonies elsewhere on the lake are disturbed, it can be found and used as a refuge. This would probably result in a larger number of species in the National Park and increase its interest for the visitor;
4. at the same time, to make a propaganda effort in neighbouring villages, in order to encourage more care for the breeding colonies of birds and so prevent unnecessary disturbance of those which are situated outside the National Park.

SPECIAL PROBLEMS OF THE MANYAS BIRD SANCTUARY

(MANYAS KUŞ CENETTI NATIONAL PARK)

- by -

David Lea

The history and general character of the Kuş Cenneti and of Lake Manyas as a whole have been described by Mr. Tansu Gürpınar and I need therefore only preface this paper by noting that in the National Park about 1700 pairs of Cormorants, Herons and Spoonbills nest, while on Lake Manyas as a whole there is a breeding population of about 3,000 Ardeidae and Spoonbills and Ibises (Threskiornithidae). A few pairs of Dalmatian Pelicans (Pelecanus crispus) also nest on the south shore and White Pelicans are present during most of the year, up to 3,500 having been recorded.

In 1967 the Turkish Government asked the Council of Europe for assistance in providing an ornithologist with experience of reserve management to visit Lake Manyas to advise on various aspects of the management and administration of the reserve. It was agreed that two visits should be made, at times of high and low water levels, and my first visit was made in the first week of June. The second visit preceded this Meeting.

Following on my first visit an interim report was submitted. Since a new motor road has been built to the Kuş Cennetti increasing numbers of visitors are to be expected. I have therefore felt that the first object in the development programme for the reserve should be to provide adequate facilities for visitors to observe and enjoy the birds, without causing disturbance, and the interim recommendations are primarily concerned with this aspect.

The erection of an information building at the entrance is suggested from which a general view of the colony can be obtained. Displays would be provided illustrating simple ecology related to what visitors might see at Manyas and the need for conservation.

A large observation tower has been recommended with access along a clearly-defined path. This tower should be capable of holding at least 25 people at one time and the site has been chosen to give views of the centre of the main colony. Two additional smaller hides are suggested to which access will only be allowed to visitors who have purchased a permit beforehand and who will be escorted by a warden.

By July, when the peak number of visitors can be expected, the breeding season of birds is nearly over and the interest of the nesting colonies declines, so that it is being suggested that it might be possible to provide a further hide close to the lake shore. Here, during the autumn large flocks of birds rest and feed and could provide a fine spectacle. Pelicans can usually be seen.

Kuş Cenneti has a very important part to play in encouraging an

interest in nature conservation in Turkey. Because it is the first bird reserve in the country and because of the spectacular nature of the birds to be seen, it can fulfil this role especially well.

There are many other problems on which advice is being sought and it is a very sound policy on the part of the authorities that they are aiming to obtain as much advice as possible before embarking on any large scale developments. It may be of interest to list some of these problems with possible suggestions for their solution.

The size of the reserve

I think that some enlargement would be beneficial: (a) to provide a 'buffer zone' for the reserve, especially for the purpose of restricting the effects of shooting on the wildfowl population at the start of the breeding season; and (b) to provide a general recreation area for visitors at a sufficient distance from the breeding colony to ensure that no disturbance is caused.

Another point which merits consideration is the situation with regard to the fields immediately to the north of the reserve. All round Lake Manyas the low-lying fields are flooded until early June. After that time they are ploughed and crops such as sunflower, melons and beans are grown. These fields, until they dry out, are used for feeding by many of the birds. This applies to all the colonies at Manyas and it has been interesting to observe that many of the Grey Herons (Ardea cinerea) nesting at Kuş Cenetti flew right across Lake Manyas, a distance of 10 km. to feed in the lagoons at the south side which remain flooded longer than those in the north. The maintenance of the present water-regime and land-use may therefore be of the utmost importance. It is also interesting to speculate on the possibilities of acquiring one part of this area, close to Kuş Cenetti and maintaining the water level by artificial means.

Conservation management

Until a detailed scientific study has been made it will not be possible to prepare a full management plan. There are however certain suggestions for management which can be made now.

So long as Kuş Cenetti is the only part of Manyas protected as a nature reserve it will be important to provide as wide a range of habitats as possible. Already under discussion is the planting of suitable trees for Squacco Heron (Ardea ralloides) and Glossy Ibis (Plegadis falcinellus). The former nests only in small numbers and the latter no longer breeds in the National Park, although both are common on the south side of Lake Manyas. It is also conceivable that by suitable 'pruning' of one or two trees Dalmatian Pelicans (Pelecanus crispus) could be attracted to nest in the reserve.

Some clearings made in the dense Phragmitea bed would be an advantage and I have been told that the low-lying ground immediately to the north of the main colony used to be much favoured by ducks in stormy weather. This area has now been changed by the planting of willows and other trees. Perhaps at least a part could be allowed to

revert to its former condition.

Scientific research

Some research will be essential for the proper management of the reserve, but it may be that Kuş Cenetti could form the base for a larger research station with suitably qualified resident staff and visiting research workers perhaps from Istanbul University. There is a need for research into the ecology of wetland areas in this region and Manyas, with its apparently high productivity, may be especially suitable for such a centre. It is also conveniently close to other areas of high ornithological interest such as Lake Apolyont and İznik.

I incline to the view that such a station should be established at Manyas, if the necessary support and finance can be obtained. The possibility of grant aid from international agencies could well be explored, since a full research programme at Manyas would be of value far beyond the boundaries of Turkey.

The need for further information

Turkey must be one of the few countries in the world where the Government has entered the field of active bird conservation without pressure from a voluntary ornithological society. If, however, a network of reserves is to be established there will be an urgent need for accurate and sustained observation so that the most important sites are protected. Such information can only be provided by co-ordinated coverage by voluntary observers, so that the establishment of a Turkish Ornithological Society would seem to be of prime importance. There are several outside ornithologists with suitable experience and a great love for the country who would be only too pleased to assist with the establishment of such a society.

(d) The importance of Turkish wetlands, especially for wildfowl and problems involved in the application of the MAR Project to their conservation.

WETLANDS AND WILDFOWL IN TURKEY

- by -

Nihat Turan

Turkey has about a million hectares of wetland and swamps, which provide breeding or wintering places for great numbers of wildfowl. But these water areas are also of great importance to the country for agriculture, being used both for irrigation of agricultural land and for reclamation purposes to meet the needs of new land for cultivation. Up to the end of 1965 about 88,500 ha. of swamp land had been drained, but at the same time about 50,350 ha. of new water surface had been created by the construction of dams. When a further 21 dams under construction have been completed, the total new water surface will be raised to 89,550 ha.

When the Directorate General of State Water Works (D.S.I.) completes its survey and management plans for wetlands, it should be possible to attempt a more exact determination of wildfowl sanctuaries than at present. Up till now no comprehensive research and recording have yet been undertaken in regard to the breeding and wintering populations of wildfowl on the wetlands.

The only wildfowl sanctuary yet established in Turkey, the Manyas Kuş Cenneti Milli Park, is described in detail in other papers presented at this meeting and it is only necessary to mention a few additional points here. To establish the Kuş Cenneti, certain reed-bed areas and some adjacent village fields were expropriated and added to the main part of the reserve, which consists of a stand of about 1500 willow trees and an area planted up with a further 2000 willows and some other species. Within the Kuş Cenneti full protection is given not only to wildfowl but also to other kinds of bird both in the breeding season and during winter.

In Turkey as a whole there are still well over forty lakes and other wetlands, supporting a rich variety of wildfowl. Areas liable to flooding are also of considerable importance for waterfowl wintering in Turkey. The main lakes and wetlands, listed according to regions and most of them shown on Map fig. , are as follows:-

(1) Thrace: three areas: L. Terkos, Büyük and Küçük Çekmece Lakes and the Meriç /Evros river basin.

(2) Marmara: five areas: L. Manyas, L. Uluabat, L. Ece, L. Iznik and the Sakarya estuary (Karasu).

(3) Aegean: five areas: Gediz (Küçük and Büyük Menderes) flood areas, Milâs (the Tekfur storage swamps) L. Koyceğiz, L. Bafa and L. Marmara.

(4) Central Anatolia: thirteen areas: L. Tuz (the Salt Lake), wetlands and swamps of the Cihanbeyli plains, L. Eber, L. Akşehir, L. Cavuscu, Sakarya flood plain, L. Burdur, L. Eğridir, L. Beyşehir

L. Suğla, Konya-Ereğli area, Develi-Tomarza swamps and the Kizilirmak flood plain.

(5) Black Sea coast: five areas: Bafra fish ponds, Terme coastal lakes, Çarşamba coastal area, L. Ladik, and the shore-line generally.

(6) Mediterranean six areas: L. Amik, Seyhan and Geyhan estuaries (Karataş), Taşucu (Göksu estuary), L. Kestel, L. Söğüt and L. Elmali.

(7) Eastern Anatolia: L. Çildir, Aras valley, Iğdır plain, Muş plain, L. Van and L. Hazer.

Of the species of wildfowl, ducks and geese, found in these areas the most abundant are:-

Anas platyrhynchos. strepera, acuta, penelope and crecca, Nyroca nyroca and ferina, Aythya fuligula, Anser anser (eastern pink-billed race) and albifrons (typical race), Casarca ferruginea and Cygnus cygnus and olor.

Species occurring in moderate numbers are - Spatula clypeata. Netta rufina. Anas querquedula and angustirostris, Anser fabalis and erythropus and Branta ruficollis.

In small numbers or rather rare are:-

Bucephala clangula, Oxyura leucocephala, Mergus albellus, mergamser and serrator, Aythya marila, Melanitta nigra and fusca, Clangula hyemalis and Somateria spectabilis.

Of very rare occurrence are:-

Anser caerulescens and Alopochen aegyptiaca.

In addition to wildfowl proper, the list of limicoline and other waterfowl, which has been recorded in such books as Prof. Dr. Saadet Bayramoğlu's 'Birds of Turkey' or noted by such observers as Mr. Zeynep Halim and Mr. Abbas Celâloğlu, runs to some 58 species. Except for some research and ringing undertaken by the Istanbul Zoological Institute at the Kuş Cenneti, Turkish ornithologists have not yet done much in the way of recording and census work. However, we wish to earmark and establish many more wetlands as wildfowl sanctuaries and to participate fully in the future in the international activities of I.W.R.B.

A PROVISIONAL CHECK-LIST OF TURKISH WETLANDS

by

C.D.W. Savage, H.F. Porter and W.H.N. Wilkinson

The first List, covering European and North African Wetlands of International Importance, prepared under Project MAR (conservation and management of temperate marshes, bogs and other wetlands), included a brief reference to Turkey, although it was stated that information was insufficient to compile a list of sites strictly comparable with those of other countries. Nevertheless, it was thought to be already clear that at least nine areas in Turkey were of extreme ornithological importance, both as wintering and breeding areas, namely the Lakes of Manyas, Apolyont, Akşehir, Burdur, Amik, Tuz, Eber and Gala and the Yitanly island in Lake Beyşehir.

A study of the papers presented at this meeting, together with the personal experience of the authors, now makes it possible and desirable to draw up a fuller list as a starting point for future MAR Project investigations. It is almost certainly still not complete, and on the other hand no attempt has been made or should be made at this stage to categorise or classify the areas included: many of them certainly will not qualify after investigation for the eventual MAR List. For convenience they are cross-referenced to the 1: 800,000 map of Turkey issued by the Harita Urmun Müdürlüğü.

1. Istanbul sheet

Meriç River (Einiz-Uzuniköprü) D& C.4.
Karak Suyu estuary D.5. Tekirdag-Başulan Bere C.7.
Büyük Çekmece C.9. Küçük Çekmece C.9.
Terkos gölü C.9. Iznik gölü E.11.
Apolyont gölü E.9. Arapciftlik/ Dalyon E.8.
Manyas gölü E.7. Gönen delta E.7.
Koçabas river (Karabiga) E.6. Kumkale (Çanakhale) F.3.
Burhaniye G.5.

2. Izmir sheet

Çandarlı H.5. North side of gulf of Izmir I.5.
Marmara gölü I.7. Küçük Menderes estuary J.6.
Büyük Menderes delta K.6. Bafa gölü K.6.
Güllük L.6. Gökova/ Akcapihai L.8.
Koycegiz gölü & estuary M.9. Koca çay below Kinik N.10.
Mountain lakes near Elmali M. 11 & 12.
Acigöl & neighbouring lakes J. & K. 11 & 12.

3. Ankara sheet

Sapanca gölü D. 12. Sakarya estuary C.13.
Porsuk marshes near Alpu F.14.

Balikdami nr. Sivrihisar G.15. Moğan gölü F.18.
Samsun gölü H.18. Kulu gölü H.19.
Tuz gölü H. 19 & 20, I. 19 & 20.

4. Konya sheet

Burdur gölü K. 12. Karamik gölü I. 14.
Hoyran gölü J.14. Eğridir gölü J. 14.
Eber gölü I. 14. Akşehir gölü I. 15.
Çavuşcu gölü I. 16. Beyşehir gölü J. 15.
Suğla gölü L. 16. Göksu estuary N. 21.
Eriangle of marshland Konya - Niğde - Karaman K. 18,19,20,21.

5. Sivas sheet

Kizilirmak delta B. 25. Yesilirmak delta C. 27.

6. Malatya sheet

Marshes round Develi I. 23. Marshes north of Ceyhan L. 25.
Seyhan estuary & Tuzla lagoons M.23 Ceyhan estuary M. 24.
Amik gölü N. 26. Marshes south of Maraş K. 27.
First valley south of Birrak L.30. Hazer gölü I. 33.

7. Erzerum sheet

Çildir golu C. 41. Bialik gölü F. 42.
Marshes north of
Doğabayazit G. 43. Haç gölü H. 39.
Nazik gölü H. 39. Nemrut gölü I. 39.
Van gölü H. & I. 40 & 41 Erçek gölü I. 42.

8. Musul sheet

None.

The amount of information available on the 63 areas listed above varies considerably, but it is believed that all of them are extensively used by waterfowl, under certain conditions either in winter or in summer, or sometimes - particularly in the case of those situated in the west - at both seasons. Nevertheless they certainly vary very greatly in importance and what is now needed is a really careful assessment. On such evidence as is already available at least five of those provisionally included in the original MAR List are both important and also under threat from drainage, excessive shooting or other pressures - namely the Meriç, Manyas, Apolyont, Akşehir and Amik, to which the Büyük Çekmece should perhaps be added.

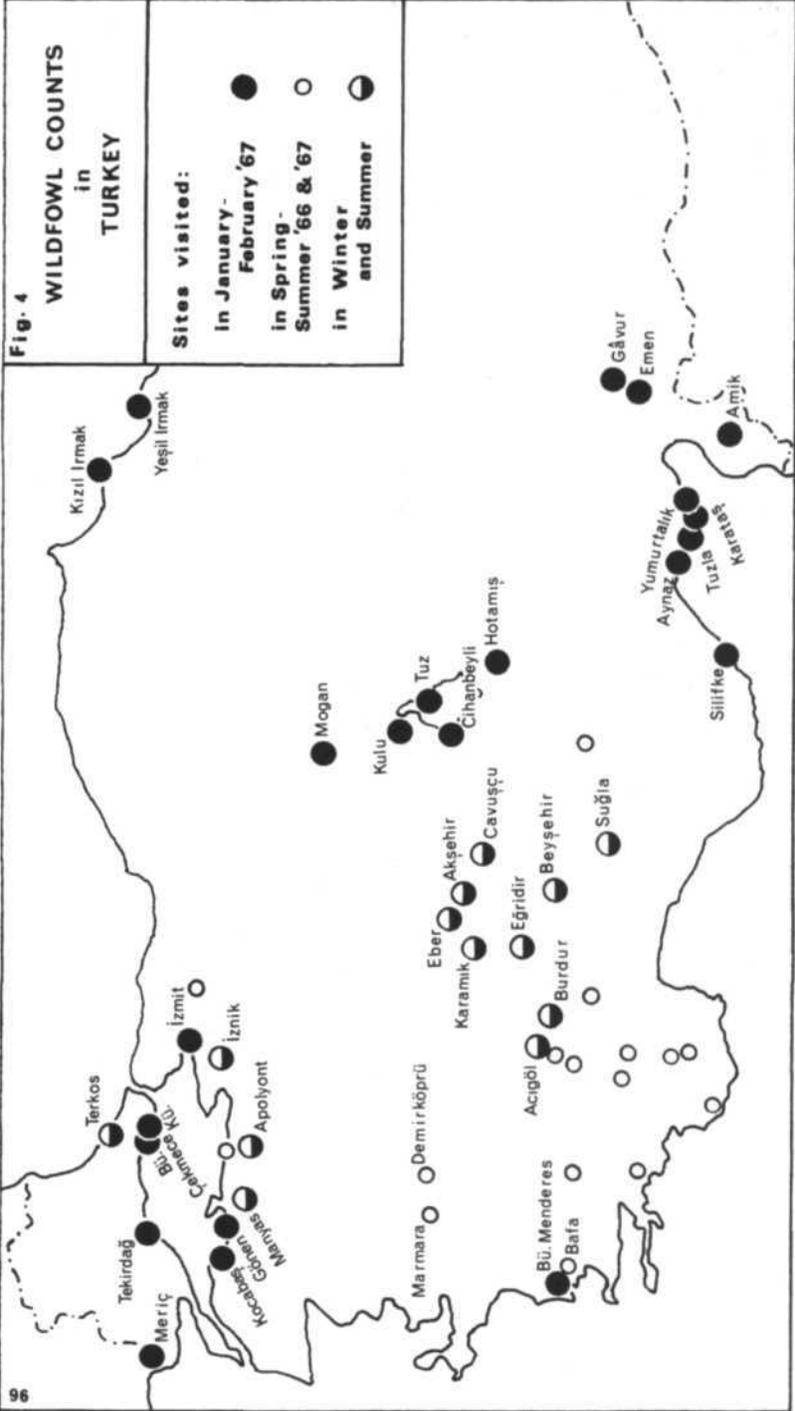


Fig. 4
WILDFOWL COUNTS
in
TURKEY

Sites visited:
 In January-February '67 ●
 in Spring-Summer '66 & '67 ○
 in Winter and Summer ◐

THE IMPORTANCE OF TURKEY AS A WINTERING GROUND
FOR WILDFOWL

- by -

G.L. Atkinson-Willes

1. The International Wildfowl Research Bureau has recently made plans for an annual census of the migratory wildfowl which winter in Europe, south-west Asia and northern Africa. The primary aim is to collect sufficient data for a detailed study of the trends in population, in each part of the winter range. This is essentially a long term investigation, requiring a series of data extending over several years. In the meantime the results can be used to assess the relative importance of each region, and to indicate the most profitable localities in which to establish reserves.

2. The first census took place in mid-January 1967. Records have so far been received from 3550 localities in 26 countries, and the total count now stands at 2,700,000 ducks and 61,500 swans. Further records from another four countries are expected to arrive shortly - amongst them the counts from the U.S.S.R. which are reported to total 3½ million.

3. The purpose of the present paper is:-

- (a) to summarize the results of the wildfowl counts made in Turkey during January and February 1967, and
- (b) to compare these with records received from other countries.

4. The kind of result which it has been possible to obtain from the counts in south-east Europe and south-west Asia is illustrated by three maps.

Fig. 4 indicates the "Count Points" in Turkey, the names and location of the places for which data have been received. It also shows the location of a number of places which were not covered during the census, but which have been visited during the summer and are known to attract numbers of wildfowl. These have been taken from the lists contained in the following reports:-

Olney, P.J.S. (ed.) 1965. Project MAR: List of European and North African wetlands of international importance. IUCN Publications, new series, No. 5.

Savage, C.D.W. 1966 Preliminary list of Asiatic Wetlands. Cyclostyled report to I.W.R.B.

Savage, C.D.W. 1967 Wetlands and Wildfowl of Iran. Cyclostyled report to I.W.R.B.

Wilkinson, W. (in litt.) 1967. List of wetlands in Turkey.

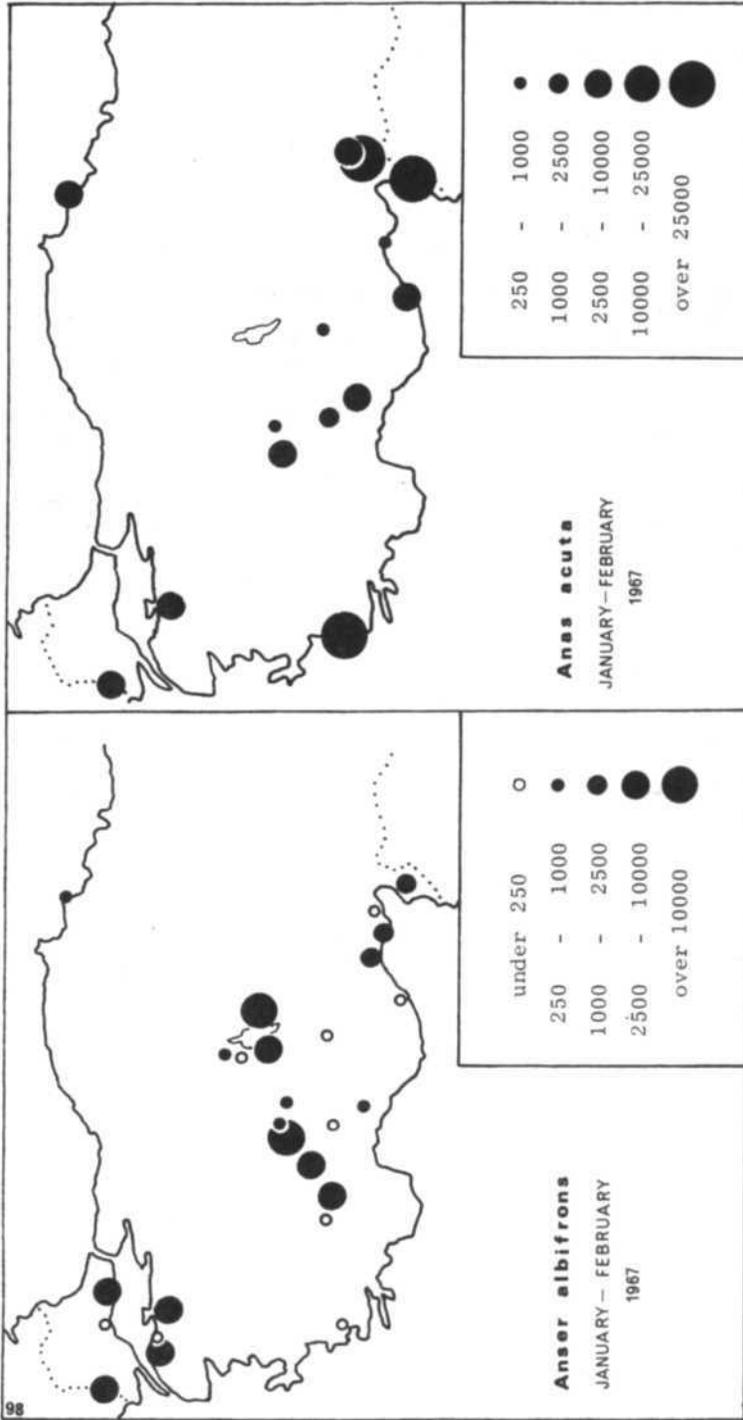


Fig. 5 : The numbers of Anser albifrons and Anas acuta recorded at various sites in Turkey during winter, 1966/67

The two other maps, reproduced in Fig. 5, give a sample of information obtained on the numerical strength of individual species at each site during January and February 1967. If counts were made at the same place on more than one occasion, the largest has been used. No attempt has been made to include an estimate of the population on waters which were not visited during the two month period, even though records are available for previous years.

5. The weather during the first two weeks of January 1967 was unusually cold over most of south-east Europe, This resulted in a massive movement of wildfowl, the effects of which were noticeable in many countries, including Hungary, Roumania, the Netherlands, Britain, Tunisia - and not least Turkey. In the Meriç valley the population is believed to have decreased sharply soon after 14th January, when 28,000 Anatidae were counted on the 8 km. stretch between Pasali and Orfana. Elsewhere some very large increases were recorded during the next three weeks. At Beyşehir Gölü and Eğridir Gölü the population increased from a total of 2000 ducks in mid-January to 35,000 by the second week of February. A similar increase is believed to have occurred at Manyas Gölü between 15th and 21st January.

Most of the counts in Turkey, except in the north-western districts and around Adana, were made either in late January or February; it seems likely, therefore, that many of the birds observed had arrived only a short time before. This supposition in no way detracts from the value of the sites concerned; on the contrary, it implies that they provide the means of survival for large numbers of migrants which might otherwise have been faced with starvation.

6. Even from the small amount of data at present available it is clear that a number of areas in Turkey are of prime importance, and ought to be conserved at all costs. In general any area which is capable of holding 25,000 ducks, even for a short while, should be regarded as a wetland site of international importance. The following are the populations recorded on a number of Turkish sites in January and February of 1967.

MEMBRES DELTA.	300,000	MERIÇ VALLEY	28,000
AMIK GÖLÜ	155,000	EĞRIDIR GÖLÜ	18,000
SILIFKE LAGOONS	60,000	BEYŞEHİR GÖLÜ	17,000
TUZLA LAGOON	50,000	EBER GÖLÜ	15,000
MANYAS GÖLÜ	43,000	GAVUR GÖLÜ	15,000
EMEN GÖLÜ	43,000	KARAMIK GÖLÜ	10,000

7. Several of the places mentioned above are of very special importance to certain species, notably Anas acuta, A. penelope, A. crecca and A. platyrhynchos. This was clearly demonstrated by the 1967 census, during which records were obtained from a total of 3550 localities in 26 countries. These data have been used in the following tables to produce a list of the 10 largest counts received for each species. It will be seen that most of the lists contain at least three Turkish sites and some as many as five.

Without doubt, there must be a number of sites, of equal or greater importance, for which no records are available or have not yet been taken

into account. Obvious examples, in countries other than Turkey, include the Nile Delta, the numerous marshes of the Tigris-Euphrates basin, the shallow bays of the Caspian Sea, and the marshes of the Niger valley and Senegal. In Europe the cover of the counts was more comprehensive, the only serious omissions being the marshes of the Guadalquivir, the Donau (Danube) delta, the Sea of Azov and possible some sites in Italy, Greece and Yugoslavia.

Despite these qualifications, the tables provide a good indication of the relative value of the various sites. In particular, they suggest that the concentrations of wildfowl in Turkey are a great deal larger than those occurring in the northern, central and western regions of Europe.

8. The following Tables show the 10 largest counts of various species, obtained during the International Wildfowl Census of January - February 1967.

ANAS ACUTA

TURKEY	AMIK GÖLÜ	c.	75,000
	MENDERES DELTA		60,000
	EMEN GÖLÜ		40,000
	SILIFKE LAGOONS	over	10,000
IRAN	MORDAB		10,000
FRANCE	AIGUILLON		9,000
TURKEY	MANYAS GÖLÜ		8,000
NIGERIA	NGURU-MATARA		6,000
N.W. INDIA	NAJAFGARH JHEEL		5,500
TURKEY	KERIÇ VALLEY)		
IRAQ	ABBARA-L'AHAMAR)		5,000

ANAS CRECCA

TURKEY	MENDERES DELTA		45,000
FRANCE	RHONE DELTA		14,000
TURKEY	MERIÇ VALLEY		12,000
	EĞRIDIR GÖLÜ		12,000
GREECE	PORTO LAGO		12,000
NETHERLANDS	SCHELDT ESTUARY		10,000
IRAN	LAKE FAMUR		8,000
TURKEY	KIZILIRMAK DELTA		6,000
SPAIN	EBRO DELTA		6,000
TURKEY	KARATAS LAGOONS		4,000

ANAS PLATYRHYNCHOS

NETHERLANDS	SCHELDT ESTUARY		34,500
FRANCE	RHONE DELTA		30,000
G.D.R.	River ELBE (km. 261-470)		29,000
NETHERLANDS	IJSSELMEER		27,000
G.D.R.	ROSTOCK-RÜGEN COAST		26,000
F.G.R./FRANCE	River RHINE: Basel-Strasbourg		24,000
TURKEY	MENDERES DELTA		22,000
	MANYAS GÖLÜ		16,000

DENMARK	RØMØ	16,000
TURKEY	KIZILIRMAK DELTA	11,000

ANAS PENELOPE

TURKEY	MENDERES DELTA	105,000
NETHERLANDS	TERKAPLESTER POELEN	40,000
FRANCE	MORBIHAN	35,000
	RHONE DELTA	23,000
SCOTLAND	CROMARTY FIRTH	12,000
TURKEY	EBER GÖLÜ	10,000
	YUMURTALIK LAGOONS	10,000
ENGLAND	STOUR ESTUARY	9,500
	OUSE WASHES	9,500
TURKEY	BEYŞEHİR GÖLÜ	9,000

ANAS CLYPEATA

TURKEY	MENDERES DELTA	23,000
INDIA: MADRAS	TENKASI	15,000
TURKEY	KIZILIRMAK DELTA	8,000
FRANCS	RHONE DELTA	6,800
N.W. INDIA	NAJARFGARH JHEEL	3,500
W. PAKISTAN	V.TARAI KHAR-RO JHEEL	2,000
	MAHBOOB SHAH JHEEL	2,000
TURKEY	MANYAS GÖLÜ	2,000
TUNISIA	LAKE OF TUNIS	1,600
TURKEY	KARAMIK GÖLÜ	1,500

AYTHYA FERINA

NETHERLANDS	IJSSELMEER	25,000
TURKEY	MENDERES DELTA	22,000
TUNISIA	LAKE ISCHKEUL	12,000
FRANCE	RHONE DELTA	10,000
NETHERLANDS	S. WAAL in GELDERLAND	9,500
IRELAND	LOUGH NEAGH	7,000
FRANCE	LAC DE GRAND LIEU	7,000
SCOTLAND	DUDDINGTON LOCH	6,000
FRANCE	ILE ST. AUBIN	5,800
SWITZERLAND	LAC LEMAN	5,700

PROBLEMS OF TURKEY'S WETLANDS AND WILDFOWL: A TEN
YEAR PERSPECTIVE

- by -

W. H. N. Wilkinson

Introduction

Although the main aim of this conference is to survey and discuss the wildlife resources and conservation problems of the Near East region as a whole, the purpose of this paper is narrower than this. In it the writer hopes to focus more clearly on these problems in the country of our good hosts, the Turks, and to try to offer some contribution towards their solution.

first of all a word of caution is necessary. The writer is no expert ecologist nor even a skilled ornithologist. He has, however, been intimately connected with Turkey for over ten years and made it his home for more than four of them. During this time he has covered most of the country, particularly the west - by no means always at the best time of year for wildfowl, since this is seldom good for travelling. He has visited Van and the east, the valleys of the Euphrates and the Tigris, the marshes around Lake Amik and the Cukurova, but cannot claim familiarity with them. Although there is an abundance of interesting information about migration routes and distribution patterns etc., to be gathered in these localities, there is less immediate urgency as far as conservation is concerned than in western Turkey where population pressures are so much greater. Although some of the conclusions of this paper have a general application, it is with western Turkey that the writer is therefore principally dealing and on which his deductions are based.

Habitats

One of the main problems of assessing the wetland and wildfowl potential of Turkey is the enormous variation in climatic conditions, and the number of different types of habitat, some of them very seasonal, which this produces. West of 54° E. which is the area with which the writer is familiar, there are a number of wetland complexes each with its own particular characteristics. These can be considered as follows:-

- (i) The Meriç/ Evros river and the marshes and lakes of the Marmara region. These areas are of importance all the year round, though for different reasons.
- (ii) The river deltas of the Aegean of which the Menderes is the most important. Certain areas of these too present features of great interest throughout the year.
- (iii) The complex of lakes centering on Lake Eğirdir, north of the Taurus range. These lakes vary greatly in interest and certain of them are of relatively greater interest in summer than in winter.

- (iv) The winter marshes of the central Anatolian plateau which include, partly for reasons of convenience, the Sakarya/Porsuk river marshes and the wetlands around the Salt Lake in the Konya region. These are of less interest in summer, though very important in winter.

These four areas have differing climatic conditions, and so offer quite a number of alternative habitats for wintering wildfowl. This enables birds to find food and unfrozen water without moving too far and also leads to spectacular concentrations in suitable areas under pressure of severe weather conditions.

Now is perhaps a convenient moment to introduce what in the writer's opinion is a popular misconception. Thanks to these spectacular concentrations, the belief has been fostered in the past - largely by foreign sportsmen - that every marsh, river, lake, area of flood-water in Turkey teems with wildfowl. This conception is fallacious because, although nearly every marsh in Turkey does at some time of year and under certain conditions carry large numbers of wildfowl, they do not all do so at the same time; for example, when the writer was observing large numbers of geese and duck on the Meriç, Dr. Szijj and Mr. Hoekstra were reporting very little from Lakes Apolyont and Manyas; ten days later, however, the writer found large concentrations on Lake Manyas and even more so on Apolyont, but a friend reported that the Meric marsh was frozen up and that there was very little about.

This seems to underline one of the main problems confronting any extension of the MAE Project to cover Turkey. Wetlands which have only a very seasonal life and which, incidentally, in summer are barely recognizable as potential winter habitats for wildfowl at all, will require special measures if they are to be assessed with any degree of realism. Indeed the assessment of Turkey's potential as a whole presents formidable problems, for the following reasons:-

1. Large distances.
2. Though the main roads are very good, communications, especially in the winter, are difficult.
3. The intensely seasonal nature of the various habitats.
4. Climatic variations and the inter-relation between the various areas.

To the writer's way of thinking an extended tour of the type undertaken by Dr. Szijj and Mr. Hoekstra, although it produces valuable results and spotlights many interesting problems, does not really provide the answer. In such a tour most of the important areas of a permanent nature are likely to be discovered, but many of the others will not be found or may be "written off" because no wildfowl were present at the time of the actual visit. Lake Manyas is a case in point. To get a true picture Turkey will need to be divided into several, perhaps ten, zones each of which should be kept under observation simultaneously and intensively for twelve months or so; at certain times of year different localities will need visiting as often as once a

fortnight, so quickly does the pattern change. The areas to be assessed too are often so large that the usual counting methods are virtually useless and fresh methods will need to be evolved. Present methods are often so inaccurate as to be almost meaningless. They do, however, err very greatly on the side of understatement, so, as far as timely conservation measures are concerned, they are probably of some value; anyway a start has to be made somewhere, and already some interesting features are beginning to emerge. All this, however, indicates that, although the extension of the MAR Project to Turkey is highly desirable, it will nevertheless be a costly operation and will need a considerable amount of careful detailed planning if the best results are to be achieved. One or two persistent individuals slogging round immense distances are likely to produce much less valuable, and, indeed, possibly even distorted results than a properly planned and manned campaign.

Migration routes and the build-up of winter concentrations

It may be useful for future winter wildfowl counts, and indeed for the possible drawing-up of a MAR plan of action, if a word or two is now devoted to the main migration routes into Turkey, and how climatic conditions affect the build-up of wildfowl concentrations in the various localities. It should be stressed that this is all extremely tentative, since there is very little evidence to hand and what exists is far from conclusive.

The main evidence comes from the albifrons geese wintering in Turkey, since certain variations enable two different groups to be differentiated. There seems to be no inter-relation between the two groups. Albifrons in the Salt Lake region is a darker variant with slightly fewer 'teeth' and a lower call note than the whitefronts of the Meric and Marmara, which are identical with Albifrons albifrons found in Western Europe. These darker whitefronts arrive at the north of the Salt Lake, presumably from Russia and possibly down through the Samsun marshes, towards the end of October. They build up to their maximum concentrations around mid-November and then seem to spread gradually around the region, and by the end of December when the weather conditions have become severe, they are to be found in the area just to the south of the lake where there are extensive warm springs, which keep large areas unfrozen. The build-up of whitefronts on the Sakarya/ Porsuk rivers seems not to occur before mid-December, by which time there are large areas of flood-water, and perhaps this represents a spread out of the population from the north of the Salt Lake or a fresh wave coming down from Samsun. There is little information about the duck movements, but allowing for the different nature of the habitats the writer believes that they follow much the same pattern, except that they move into the Sakarya/ Porsuk regions earlier than do the geese, generally in mid-November.

The pattern for the Meriç river marshes and the snail marshes north of the Marmara is very different. The geese and duck do not start arriving here in any numbers until end-November, for the duck, and early December for the geese; the populations of both continue to build up until end-December or early January, by which time there is a trickle through to Lakes Manyas and Apolyont, which until this time carry very little. Then in mid-January, especially if the weather is cold, there

is a mass exodus, presumably to Manyas and Apolyont, and probably also to the Menderes delta. In mild years this exodus does not take place, or rather it is considerably reduced, and duck and geese are to be seen throughout the winter on the Meriç marshes. The writer believes that the movements of wildfowl on the Menderes delta are partly tied up with the climatic conditions of the Meriç river, but possibly more so by the weather conditions on some of the Macedonian marshes further to the west. There is also a brief autumn migration, usually in early September, which lasts about three days to a week, when large quantities of duck, but not geese, move through the Marmara and Aegean areas, possibly on to Egypt and further south; there is a similar return flight early in March, though it tends to be somewhat more extended in duration.

In short, therefore, the writer believes that there are two main flight ways into western Turkey; one, the eastern route, stems from Russia down through Samsun to the Salt Lake, from where it spreads out and possibly continues also south-east; the other probably originating from a build-up of wildfowl on the Danube marshes and dependent on weather conditions there, comes down to the Thrace and Marmara regions and then along the Aegean coast of Turkey, possibly reinforced by a further line running south-east from Macedonia to south-western Turkey. Much of this, however, is pure hypothesis, and much more detailed work is required to prove or disprove this theory.

Drainage

The amount of drainage and reclamation activity has increased enormously during the last ten years, and is likely to continue or increase still further. These enterprises are by no means always harmful to the wildfowl, since in many cases additional food supplies are created. Nevertheless, ruthless drainage schemes in complete disregard of the local ecological conditions do present a grave risk for the future. This is obviously not the place to list the various places which have been destroyed, or are now threatened by drainage schemes. Mention must, however, be made of the various drainage projects on the river Sakarya, which have considerably reduced the large areas of marsh along this river, and detracted from the great importance of the region for wintering wildfowl. Drainage schemes too are under way around Lake Apolyont, though in the writer's opinion these are less harmful than the scheme to take water from Lake Manyas to supply the requirements of the various new industrial undertakings in Bandirma.

The area which is most seriously threatened by drainage plans is the Meriç River: a good deal of drainage has already taken place, and this may already have reduced the areas suitable for wildfowl. The most important area, however, Lake Gala and its surrounds, remains. There is, however, a vast new scheme sponsored by Senator Javits and his Group, under which the Turkish and Greek governments are to co-operate in draining the whole of the Meriç/ Evros delta. This would have fatal effects, not only on that area, but probably on the whole wildfowl position in western Turkey. It is therefore much to be hoped that the development plan will provide for a large joint Turko- Greek reserve, because this area is probably the most important in Turkey, at least as

far as European wildfowl are concerned, and it is also the most threatened.

Shooting

In discussing the importance of shooting pressures on wildfowl populations, it is essential to bear in mind that in Turkey a large proportion of the rural population shoot in order to help out their winter food supplies. In the poorer Anatolian villages the villagers during a cold winter are often short of food and a goose or two makes a very welcome addition to the family commissariat. Probably during the last ten years there has been an increase in shooting by villagers as they have become relatively more affluent and cartridges and guns easier to get. Much more serious, however, is the very much greater increase in shooting by the population from the towns for sport. This is growing enormously, particularly now that the road system is bringing more and more regions within reach of Istanbul or Ankara. In certain regions near the large towns this shooting is assuming alarming proportions. The Meric marshes are certainly the most threatened of the important areas, and at weekends one may find a couple of hundred gunners in quite a small area and the sound of shots is almost continuous. At Büyük Çekmece, a small but most interesting marsh near Istanbul, the numbers of geese and duck had been dropping substantially year by year as shooting pressure increased until 1966/67, when the shooting was reserved and hardly any shooting took place; then the numbers rose dramatically.

Wildfowl numbers at Gihanbeyli on the Salt Lake and the neighbouring Lake Kulu have dropped year by year, probably because the shooting pressure is very heavy in these areas; this is perhaps, however, not too serious as the geese and ducks in these areas have alternative habitats, most of which are less accessible by road.

The Turkish law is quite definite about close seasons, but unfortunately many villagers are too ignorant to observe it and enforcement is not easy. Probably some shortening of the season till, say, February 20th would also be desirable.

Turkey also has a good system whereby every so many years shooting is forbidden over a certain area, in order to build up the stock; this could be done with greater frequency over certain designated areas and on some sort of national basis, so that certain important areas could be rested systematically.

The writer feels that wildfowl shooting as a method to encourage tourism is not desirable. By all means let it be made easy, but perhaps expensive, for a tourist to buy a shooting licence, but to set aside certain areas reserved exclusively for visiting sportsmen is essentially an unsound policy and only adds to an already complicated situation. Some extra foreign exchange might be gained, but the writer feels that this would probably be very little compared with the receipts from the more conventional type of tourism and could in some measure be made good by charging expensively for a tourist shooting licence. Official guides, who might also be given some form of warden status, could also be provided, and these too could be made expensive.

All the above measures, such as a shortening of the season, stricter enforcement of the existing law, rotating certain areas, providing shooting wardens, would help, "but the real solution to the problem can only be a number of strategically placed and well-managed reserves, operating under systematic and preferably co-ordinated scientific programmes.

Reserves

Obviously it would be desirable to await the first stage of an extension of the MAR Project, the preparation and publication of a List, before deciding on the number and location of the future reserves which need to be created in Turkey. There are, however, a number of places where reserves need to be set up at once, and a halt made to drainage and shooting pressures, if a very serious position is not to be created. Examples are -

- (i) Lake Gala area on the Meriç river - the most important of all - and
- (ii) an extension to the present Lake Manyas Sanctuary.

There are also two places which would make excellent small reserves which could very suitably be run by Istanbul and Ankara universities, respectively, on a scientific basis; these are at Büyük Çekmece outside Istanbul and Lake Moğan near Ankara. They could also to some extent be treated as pilot or training schemes.

Education

Except for the admirable National Parks Section in the Ministry of Agriculture and the Turkish Nature Conservation Association, there are still too few people in Turkey interested in ornithology or conservation. A body of informed public opinion which is to be found in most western European countries simply does not yet exist. Although foreign experts can help bridge this gap in the short term, while local experts are being trained, until educated Turks in schools and universities start taking a pride in their natural heritage and forming amateur societies to observe and protect their flora and fauna, the emotional drive to compel any Government to adopt a logical considered conservation policy will not exist. Drainage and unfettered hunting rights can mean votes won or lost, whereas it will take a long time before conservation of wildlife is regarded as being at least of equal importance. On the other hand, people in Turkey are fond of animals and are far from being the indiscriminate shooters that, for example, the Italians are; indeed many of the simplest villagers are observant and knowledgeable. This means that once some momentum towards conservation is achieved, matters could develop quite fast.

It is hard to know how the problem should be tackled; indeed it could be the subject of a conference in its own right. It would seem logical to start in the universities, where after all biology and zoology courses take place. Perhaps visiting conservationists could give courses and professional chairs for conservation could be set up. A more practical scheme, and one perhaps which would have more impact, would be for a

foreign university to team up with a Turkish university. The Turkish government could set up a reserve, and jointly the two universities could take over the running of the reserve and conduct joint scientific programmes. Thus, little by little, knowledge of what it is all about would become disseminated.

The building up of a body of educated opinion is the single most important long-term measure for protecting Turkey's wildlife and its habitats, since without this educative process, the will and means to carry through all the measures necessary to set up conservation on an organised systematic basis will not be present. It is perhaps in this field more than in any other that outside help for our Turkish friends would be most appreciated.

Conclusions

The problems posed by a country such as Turkey, which ornithologically acts as a bridge between East and West, as it has done in the development of European history, are enormous. The various measures to try and solve them are, therefore, likely to be expensive and long-term:

- (1) First and most important is the educative process required to develop an informed body of opinion, which wishes to save and preserve the flora and fauna of Turkey for future generations.
- (2) It is necessary to set up additional reserves for waterfowl and, in one or two locations, this is a matter of urgency.
- (3) The MAR Project needs to be extended to Turkey and planned in the most careful manner if the best results are to be achieved.
- (4) All drainage schemes need careful analysis by the appropriate Government Department to avoid irreparable damage. Obviously only in areas of prime importance should drainage be opposed and the MAR Project should help establish which these are.
- (5) Certain modifications to the hunting law might be desirable.

A final word: I often think it must be exasperating for our Turkish friends to be lectured to by foreigners about their own country. They are, however, fortunate to have a wonderful country, as rich in natural flora and fauna as could be imagined anywhere, and as yet relatively undamaged by human pressures. Most of us have seen our own countries to a greater or lesser extent spoiled by thoughtless and selfish exploitation of their natural resources. It is in order to avoid this fate befalling such a beautiful country as Turkey, which the writer for one has come to love, that we are here in Ankara to offer our help, advice and friendship.

Agenda Item I : the Turkish Situation

DISCUSSION

The majority of points raised in the discussions centred on three major topics, under which they have accordingly been grouped in the following summary. Where appropriate references are given to particular Papers and the names of the principal contributors to the discussion are shown in brackets.

A. LAND USE AND RESOURCE MANAGEMENT PROBLEMS

(1) Erosion

The Paper by A. Varişlıgil mentioned the great efforts and investments being put into drainage and reclamation as a means of meeting the needs for more agricultural land and higher food production. Recalling what was said in the keynote speeches by Mr. Üner and Mr. Turkoz, about loss of fertility and general deterioration and erosion in many cultivated soils, it seems possible that some diversion of effort and expenditure away from drainage (with its serious risk of impoverishing yet more soil) towards anti-erosion measures and measures to restore fertility, could well have a greater effect on productivity and be a sound policy from the point of view of the national economy (Hoffmann).

(2) Control of shooting

Outside National Park areas such as the Kuş Cenneti, it is difficult under existing legislation to impose restrictions, although local Hunting Commissions do have powers to suspend shooting in specified areas, for specified periods or in respect of particular species. Enforcement is always a problem since the poacher or illegal shooter has to be caught red-handed for a conviction to be obtained (Turan).

Shore-shooting in Scotland used to be quite unrestricted but, despite the objections of hunters, was eventually brought under control. However, as a result, the shooting has often so much improved that in the case of the Caerlaverock National Nature Reserve and Wildfowl Refuge, for example, the hunters themselves are now the strongest supporters of measures taken to restrict and control shooting in the vicinity (Berry).

(3) The reed-cutting problem

The Paper by Sziij and Hoekstra suggests that reed-cutting may sometimes be excessive from the wildfowl conservation point of view, but on the whole it probably helps to maintain a favourable environment and, as Lea has pointed out in his Paper, the cutting of clearings in dense Phragmites beds could be positively beneficial. There are, however, some species, notably Ardea purpurea and Pelecanus onocrotalus, which might be encouraged to nest or nest more freely if some areas of reed could be reserved uncut (Porter).

In the Netherlands good results are achieved by rotation, allowing only a quarter of the reed-beds to be cut in each year (Mörzzer-Bruyna).

One difficulty in Turkey is that reeds are much in demand for mixing with dung for fuel purposes (Gürpınar) although the bulk of the harvest is undoubtedly used for thatching and handicrafts (Bayer). As far as burning is concerned, there is much to be said for the Pakistan policy of encouraging the Use of Kerosene as household fuel rather than reeds and dung which are valuable as fertilisers (Savage).

On the whole the problem of reconciling wildfowl interests with exploitation of reed-beds is one of the easiest to solve in wetland management and conservation (Hoffmann).

(4) Special problems of Manyas Kuş Cenneti National Park

The essential consideration in solving these problems is to decide on the objectives of the Park. The most important seem to be (a) protection of the natural fauna and flora, (b) education of the public in enjoyment of the spectacle provided by the fauna and flora and, through this, in taking proper care of them and (c) scientific research. Other human activities in the area, such as agriculture or fishing or those which bring about fluctuations in the water level, may well be biologically beneficial to the environment as a whole (Lea).

There is no evidence of a clash of interests between fishing and birdlife, though it is quite another matter with hunting (Kosswig), but it is possible that if fishing ever became excessive some areas near the National Park might have to be put out of bounds for fishermen (Lea).

One difficulty about the Park is that although it provides an ideal nesting area, the main feeding grounds of the birds are in other parts of the lake or its surroundings, most of which are privately owned. Some extension of the boundary to include some feeding areas therefore seems necessary (Gürpınar). Unfortunately this would cost a great deal of money and adequate funds have not been available and are still not available.

The drawing off of water from the lake, for industrial use in Bandırma gives cause for concern (Wilkinson). It is estimated that 700 million cubic metres of usable water enter the lake annually through rainfall and run-off: of this 150 million cu.m. are lost by evaporation, 300 million cu.m. are used for irrigation and the remaining 250 million cu.m. would drain into the sea and so can be safely tapped for industrial purposes (Varışlıgil).

PROBLEMS OF SELECTION OF WETLANDS FOR CONSERVATION

(1) Criterion for selection

In order to choose areas to conserve, especially for wildfowl, it is necessary to study the whole picture and establish general principles and then to carry out detailed ecological studies, without interfering with development in the process (Varışlıgil).

There seems to be a basic difficulty that intensive ecological studies are required before the best areas can be selected, but such studies cannot be successfully carried out unless the area concerned is given some sort of reserve status and protected from development and other disturbance (Lewis).

In six months work in Turkey a good general idea of eight wetlands was obtained. If a month could be devoted to each of the wetlands which need to be assessed, it should be possible to obtain much of the essential information (Porter). In Turkey as in other parts of the Region there are probably a good many "effective reserves", that is wetland areas which have no official reserve status but are still comparatively undisturbed because of inaccessibility or some other reason (Savage).

(2) Waterfowl counts as a method of selection

In the first stage of the MAR Project the criterion of selection used was the abundance of waterfowl. This has been found to be a useful indicator and the inclusion of an area in the MAR List on this basis has often been found to be justified and has helped to get conservation measures adopted. But there is of course nothing sacrosanct about the list which needs to be constantly revised as more detailed information becomes available (Hoffmann).

In Britain many reserves which were selected, even after quite detailed study, subsequently proved to be unsuitable. But this is a risk which has to be taken, if any comparatively unspoilt areas are to be handed down to future generations (Cragg).

In Canada, where there is a vast area to be covered, innumerable wetlands and too few biologists - a situation in some respects similar to that in Turkey and Other countries of this Region - the approach adopted has been to aim at a comprehensive inventory of the land, using photographic and other methods to measure potential as opposed to realised productivity. This may be a better approach than the wildfowl - count method, especially as in many areas accurate counting seems very difficult (de Vos).

The first winter wildfowl counts in Turkey, made in January 1967, covered 35 sites: large numbers of birds were found in only 10 of them. It is however an important first step simply to discover that birds are present, since it is prima facie evidence that a site is worth considering for conservation. But it does not, by itself, give any clue as to why they are present or, conversely, if there are few or no birds, what is the reason for this. Absence of birds may mean very little. In fact real significance of presence or absence can only be determined by counting of as many areas as possible repeated over several years, combined with detailed ecological study, analysis of weather conditions and so on. Nevertheless if large numbers of wildfowl are found in a particular wetland, it means that the wetland deserves to be given the most careful attention (Atkinson-Willes).

It is obvious that knowledge of Turkish wetlands is not yet sufficient to allow for a classification of their importance from the MAR Project point of view. What is needed is a comprehensive regional survey over at least a two year period which would enable the wide range of climatic, seasonal, geomorphological and social factors affecting the situation to be better understood, before a final assessment is made (Wilkinson).

C. THE EDUCATIONAL PROBLEM

The problem has two main aspects - (1) education of the young starting from the schools and going on to the training of experts in the management of wildlife reserves. For the latter purpose three things are

needed: (a) research institutes for the promotion of advanced studies, the first of which could well be centred on wetland research; (b) better facilities for exchange of information and visits between experts or those training to be experts in this field in Turkey and abroad; and (c) more openings and reasonably well-paid jobs for those who have been trained. (2) Secondly there is the propaganda aspect, the education of the general public, in which press, radio, television, clubs and societies, all have an important part to play (Wilkinson).

A start has been made by establishing biological courses in many universities and senior schools (Bayer). The Ministry of Agriculture and General Directorate of Forests have been doing all they can to encourage and assist research, but without a specific Institute to act as a focus, it is difficult for Universities to organize and find the necessary funds for extensive field work (Kosswig). The need for a special research institute is fully recognized but it will need lengthy official negotiations and probably new legislation to make it possible for such a project to be implemented (Bayer).

SECOND TECHNICAL SESSION

Tuesday 10 October 1967 : Ankara

Agenda Item 2 : Comparative review of wetlands in countries of the region other than Turkey, with special reference to the status of their with special reference to the status of their wildfowl resources and to the future choice of areas for coverage by the MAR Project.

In the Chair: Dr. J.B. Cragg.

Seven Papers were contributed for this item of the Agenda. All the contributors were able to attend the Meeting and present their Papers in person.

The first five Papers, for which Mr. C.D.W. Savage, in one case with Mr. Eskandar Firouz, was responsible, summarise the information at present available to I.W.R.B. on wetlands and wildfowl in Iran, Afghanistan, West Pakistan, Iraq, and the "Levant", defined as including Lebanon, Syria, Jordan and Israel.

Each Paper gives a brief assessment of the general situation, lists the main wetland areas which have been identified and which appear to merit consideration for the purposes of the MAR Project, gives brief details of the status of wildfowl species recorded in these areas, and ends with a list of references. To avoid repetition all the references have been combined in this Report in one list at the end of the group of Papers.

Each of the wetlands listed is numbered and provisionally classified as of 'A' or 'B' importance in accordance with the method adopted in the first of the MAR Project Lists (Europe and North Africa: I.U.C.N. Publications new series No. 5). This is not to be regarded as a final assessment, but is intended to give some idea of the kind of pattern which could eventually be expected to emerge. The same applies to some extent to the "category" in which each area is placed. This follows the tentative system proposed by Dr. Y.A. Isakov in 1966 (see list of references) and which may be briefly summarised as follows:-

1. Open sea shallow waters -
 - A. Intertidal zone: a. stony; b. sandy.
 - B. Permanent shallows:
2. Bays and straits of the sea -
 - A. Shallows, exposed by tide: a. sandy; b. muddy.
 - B. Deep sea-bays (e.g. fjords)
 - C. Shallow sea-bays: a. submerged meadow; b. sandy; c. stony.
 - D. Fresh water bays: a. submerged meadow; b. emergent aquatic vegetation.
 - E. Lagoons: a. salt water; b. fresh water.
3. River mouths -
 - A. Estuaries.

- B. Deltas: a. upper; b. submerged; c. emerged.
4. Coasts -
- A. Snail islands, skerries: a. sandy; b. stony.
- B. Large islands, continental coast: a. Marshy, saltings
b. sandy beaches, (Junes etc.)
c. stony or rocky.
5. Rivers and flood plains -
- A. Lowland, meandering: a. in open meadow; b. in forest;
c. inland or 'dry' delta.
- B. Mountain rivers.
- C. Brooks: a. in meadowland; b. in forest.
6. Storage reservoirs -
- A. With stable water level.
- B. With great variation of level - a. seasonal; b. irregular.
7. Lakes -
- A. Salt: a. permanently saline; b. salinity fluctuating.
- B. Fresh, eutrophic: a. permanently fresh; b. intermittently saline.
- C. Fresh, oligotrophic.
- D. Fresh, dystrophic.
8. Hires -
- A. Fen and transitional.
- B. Peatland.
9. Temporary, flood water - : a. in forest; b. in meadow; c. in steppe; d. in desert.
10. Artificial -
- A. Ponds: a. fish; b. mill; c. farm.
- B. Irrigation, drainage: a. rice field; b. drainage network;
c. flooded pits and diggings.

The first five Papers were sponsored by the Asiatic Wildfowl Working Group's Wildfowl Survey, which is being undertaken under the auspices of the I.W.R.B. and of the Wildfowl Trust and of which Mr. C.D.W. Savage is the Honorary Co-ordinator. The Survey is supported by a grant from the World Wildlife Fund.

The other two Papers contributed for this Session by Dr. H. Löffler and Mr. L. Cornwallis respectively, concern the Lake Niriz basin in south-western Iran. Like the two Papers on the Lake Hanyas area, presented at the first technical session, they were designed to provide a case study of one of the more important wetland complexes in the region under review and to illustrate the conservation problems involved. Slides of the area were shown by Mr. Cornwallis.

The main discussion of these Papers was deferred until a later session, since it would be concerned with the general problems of the application of the MAR Project in the shore region, including Turkey. However, a few specific points were raised and are summarised at the end of the section.

THE WILDFOWL AND EWTLAND SITUATION IN ISAM

- by -

C.D.W. Savage and Eskandar Firouz

Introduction

Iran possesses many valuable wetlands of considerable importance. These are located mostly on the southern shores of the Caspian, in Seistan and in the south-west. They are not only important wintering grounds for several million wildfowl but are used extensively by birds on passage to Iraq, the Persian Gulf and to West Pakistan.

The northern parts of Iran have been well studied ornithologically (Missone, Nielsen, Passburg, Read, Savage, Schuz) but little has been done in the south (until very recently) since 1930 and more especially since Zarudny's explorations at the turn of the century. Nevertheless the general position is now well enough known to say provisionally which wetlands might be included in the MAR List when extended to Asia. In this and the four other Papers of this series, it has been thought convenient to list these areas using the same classifications as in the first MAR List (Olney 1965) and the categories tentatively proposed by Isakov (1966).

The status and distribution of wildfowl species are summarised from the latest published information (see references), as well as unpublished information supplied by S.J. Read, L. Cornwallis and the Game and Fish Department, which is gratefully acknowledged.

The general wetland situation in Iran is still favourable to wildfowl, although water pollution has reduced the availability of some areas and excessive disturbance has affected others. The work of the Iranian Game and Fish Department has however been expanding rapidly in recent years and already market hunting in the northern areas has been curtailed and sport hunting is strictly regulated. Several wildlife reserves of benefit to wildfowl are in various stages of enactment and a training programme in wildlife management is in hand for the Department's staff. Iran is therefore well placed to play an important part in the international programme for conservation of wildfowl and wetlands.

Wetland List

The following wetlands are suggested for inclusion in the MAR List for Asia and the Middle East:-

A-1. MORDAB-E BANDAR PAHLAVI 37°25'N. 49°30'E. Category 2.E.b.

About 200 sq. km. of marshes including about 30 sq. km. of shallow open water all of which drains into the Caspian Sea at Bandar Pahlavi. The whole area is exceptionally valuable for large numbers of wintering wildfowl as well as for passage migrants. Small numbers of several species remain to breed.

A-2. BAY OF GORGAN 36°50'N. 53°40'E. Categories 2.C.a/ 2.E.a.

About 800 sq. km. of wildfowl habitat comprising mostly the shallow lagoon of the Bay of Gorgan, but also the marshes of Tir Tash, the goose grounds near Qara Tappeh and the small lagoons and shallow shore waters along the Mian Kaleh Peninsula. "Wintering ground for immense flocks of ducks and coots estimated by Missone at 2.5 - 3 million, and huge flocks of Anser erythropus, Anser albifrons and to a lesser extent Anser fabalis. Recently disturbance of geese by jeeps has been an adverse factor but human disturbance has not yet seriously affected the ducks, due to the size of the area.

A-3. SEISTAN LOWLANDS 31°00'N. 61°10'E. Categories 7.B.a and b.

In Iran the Seistan lowlands comprise over 3,000 sq. km. of seasonal lake and marsh land in two distinct areas, Hamun-e Sabari to the north and the Hamun-e Kelmand to the south. It is only under exceptional conditions that the full area is flooded, and in recent years the wildfowl habitat has been limited to less than 100 sq. km., much of which is disturbed. Formerly the area was an exceptional wintering ground as well as a breeding ground for many species including Anser anser and Oxyura leucocephala. Due to flood control and storage projects on the Helmand River the hydrology has been upset, but even in its present limited role it is of great importance to wildfowl wintering in Baluchistan.

A-4. LAKE NIRIZ 29°30'N. 53°40'E. Categories 7.A.a. and 8.A.

Some 600 sq. km. of shallow lake fed by fresh to brackish springs; elevation approximately 1,550 m. The lake comprises two parts, Lake Bakhtigan and Lake Tashk, merging in times of high water. Parts of both provide wintering grounds for large numbers of ducks, geese and flamingo, and part of Lake Tashk is used as a breeding place by flamingo and pelicans as well as several species of duck and waders. The whole area and plans for its conservation are the subject of two special Papers contributed for this session.

A-5. LAKE PERISHAN (L. Famur) 29°26'N. 51°50'E. Categories 7.A.a and 8.A.

Salt lake of 72 sq. km. at about 620 m. elevation; closed drainage; fed partly by fresh to brackish springs. Holds exceptionally large concentrations of wildfowl in winter and on passage.

A-6. LAKE MAHARLU AND SOLTANA BAD MARSHES 29°30'N. 52°50'E.
Categories 8.A & B, & 7.A.a.

Total area of over 210 sq. km., which comprises Maharlu salt lake, with fresh to brackish springs and associated marshes in the north-west, including the extensive Soltanabad Marshes. The marsh lake complex provides wintering grounds for large numbers of wildfowl and waders of many species and the marshes of Maharlu are the breeding place of several species including (once recorded) Oxyura leucocephala. The whole area is much disturbed by sport shooters in winter and its value would be greatly enhanced by protection of the Maharlu Marshes.

A-7. RUD-E SHUR 35°50'N. 50°25'E. Category 5.A.a.

50 - 100 sq. km. of marsh at about 1,150 m. elevation and including the Qarpuzabad-Mohammad Kharreh, Ahmadabad and Karaj Marshes. Although on the outskirts of Tehran, the ornithology has only scantily been studied but the importance of the area for wildfowl wintering and on passage is not in doubt.

A-8. KHUZISTAN MARSHES 30°30'N. 48°30'E. Category 5.A.a.

About 500 sq. km. or more of seasonal marshes, of great importance for wildfowl including geese in winter. Although known to be important, the detailed ornithology of the area is still unknown. Parts of the river system are reported to be affected by pollution which is still under investigation. Also in the area, and on the Iraqi border, lies part of the Haur al Hawizah which is definitely of the highest importance (see separate Paper on Iraq).

B-1. ATREK RIVER 37°30'N. 54°30'E. Category 5.A.a.

The marshes of the Atrek and around Lake Atagel lie partly in the U.S.S.R. and have been thoroughly studied by Isakov (1940). On the Iranian side Lake Atagel is important for Anser erythropus, but the marshes along the river have recently been affected by pollution and use by wildfowl is much reduced.

B-2. FARAHABAD AND LARIM SAHRA 36°45'N. 53°05'E. Categories 9.c and 8.A.

About 50 sq. km. of valuable goose marsh and shallow irrigation reservoirs.

B-3. DASHT-E MOGHAW 39°30'N. 47°30'E. Category 5.A.a.

About 30 sq. km. of marshes along the Aras River on the U.S.S.R. border. Wintering ground of Anser erythropus and other species of wildfowl. Not yet adequately explored ornithologically.

B-4. MOUTH OF SEFID RUD 37°25'N. 50°00'E. Category 3.B.a.

About 1,000 ha. in the delta area including Hassan Kiadeh. Of particular interest during spring and autumn passage.

B-5. LAKE REZAIYEH 37°30'N. 45°30'E. Category 7.A.a.

Large salt lake at nearly 1,300 m. elevation; fresh to brackish marshes in the north east and south of the lake provide wildfowl habitat mainly on spring and autumn passage; breeding place of Tadorna tadorna and Phoenicopterus roseus. Qoyun Dagh, in the centre of the Tadorna tadorna breeding area, is a wildlife reserve (see separate Paper contributed for the next item of the Agenda).

Status of wildfowl species

Phoenicopterus roseus: Breeds on Lakes Perishan, Niriz and Rezaiyeh, and also reputedly in the Seistan lowlands. Winters in Bay of Gorgan, near

Shiraz and on the Persian Gulf Coast.

Branta ruficollis: Regular winter visitor in small numbers in the north.

(Branta bernicla hrota): One record only.

Anser fabalia: Winters in Bay of Gorgan.

Anser albifrons: Winters regularly in many parts of the country; in the Bay of Gorgan occurs in thousands.

Anser erythropus: winters in tens of thousands in Khuzistan and the south-west Caspian, including the Bay of Gorgan and Atrek Marshes; relatively abundant in other parts, including Dasht-e Moghan, Seistan Lowlands and the Shiraz lakes.

Anser anser: Believed to have bred regularly in Seistan till recently; winters in the north, Shiraz lakes and Khuzistan in hundreds and occasionally in thousands.

Cygnus columbianus: Winters occasionally in the north.

Cygnus cygnus: Winters on the Mordab and Bay of Gorgan; also occasionally on the Rud-e Shur Marshes, in Seistan and near Shiraz.

Cygnus olor: Has bred in Seistan; winters in the Bay of Gorgan.

Tadorna ferruginea: Breeds on Lake Rezaiyeh, in Seistan, on the Mian Kaleh Peninsula and possibly Lake Niriz; winters in the Bay of Gorgan and south west Caspian, in Seistan on the Shiraz lakes, in Khuzistan and on the Persian Gulf.

Anas angustirostris: Appears to breed near Shiraz; winters near Shiraz. Formerly more widespread.

Anas acuta: Winters in large numbers in the southern Caspian, particularly in the Mordab and parts of Mazanderan; numerous on passage to Seistan and in the Rud-e Shur marshes.

Anas crecca: Very numerous in the southern Caspian and formerly in Seistan; also numerous on the Shiraz lakes particularly Lake Perishan.

Anas platyrhynchos: Possibly breeds in small numbers; winters in exceptional numbers in the southern Caspian, also abundant in Rud-e Shur marshes and on the Shiraz lakes.

Anas strepera: No evidence of breeding in Iran; winters in small numbers on the Caspian and the Shiraz lakes.

Anas falcata: Vagrant.

Atlas penelope: Winters abundantly in the southern Caspian in parties of 100 - 200; found only in small numbers on the Shiraz lakes.

Anas querquedula: Winters in relatively small numbers in the south-western Caspian; found on passage on the Rud-e Shur marshes and on the Shiraz

lakes in small numbers.

Anas clypeata: Winters throughout Iran and abundantly along the Caspian.

Netta rufina: Winters in many parts of Iran often in fair numbers.

Aythya ferina: Winters unevenly and seldom commonly in different parts of the country,

Aythya nyroca: May breed near Shiraz; winters in the southern Caspian in small numbers.

Aythya fuligula: winters in great numbers in the Bay of Gorgan but in much smaller numbers in the south-west Caspian; small numbers winter in Shiraz area, maybe less than formerly.

Aythya marila: Winters in small numbers on the Caspian.

Melanitta nigra: Occasional winter vagrant to the southern Caspian.

Melanitta fusca: Winter visitor to The southern Caspian in small numbers.

Clangula hyemalis: Vagrant to southern Caspian.

Bucephala clangula: Winters in considerable numbers in the southern Caspian.

Mergus albellus: Winters in large numbers in the south-west Caspian and in lesser numbers in the south-east.

Mergus merganser: Regular winter visitor to the Caspian.

Mergus serrator: Winter singly or in pairs along the southern Caspian; much less common than Mergus merganser.

Oxyura leucocephala: Formerly resident in Seistan and ducklings once obtained from Lake Maharlu; winters in small numbers on southern Caspian; has been found on passage in Azerbaijan.

THE WILDFOWL AND WETLAND SITUATION IN AFGHANISTAN

- by -

C.D.W. Savage

Introduction

Afghanistan possesses few wetlands apart from those on her northern boundary with the U.S.S.R. on the Amu Darya and on her south-western boundary with Iran in Seistan. Although these areas have not yet been adequately studied, it is nevertheless already possible to say with confidence which should be considered when the MAR List is extended to Asia.

The status and distribution of wildfowl species is summarised from

the latest published information (Paludan 1959, and Niethammer 1967) as well as the author's own observations (Savage 1967).

The general wetland situation in Afghanistan is still favourable to wildfowl. It is only round Kabul itself and particularly at Lake Ab-Istadah that control of hunting and wildlife conservation is urgently required. A Zoological Society was formed in November 1966 on the initiation of H.R.H. Prince Nadir Shah, with the object of educating public opinion in regard to the country's wildlife and to sponsor conservation measures. Already a fine zoo is being built up, including a waterfowl collection, and wildlife legislation is under preparation. The country is therefore well placed to take part in the international programme for conservation of wildfowl and wetlands.

Wetland List

The following wetlands are suggested for inclusion in the MAR List:-

A-1 AB-E ISTADAH 32° 30'N 67° 55'E Category 7.A.a.

Shallow lake of some 200 sq. km. at over 2,100 m. elevation; breeding place of Phoenicopterus roseus and Tadorna tadorna; habitat of large numbers of wildfowl species during passage and smaller numbers during winter.

A-2 SEISTAN LOWLANDS 31° 20'N 61° 30'E Categories 7.E.a and b, 5. A.c.

2,000 sq. km. area includes shallow fresh water lakes of Hamun-e Sabari, 600 sq. km. and Hamun-e Puzak, 180 sq. km., at elevation of over 500 m. Area of marsh and lake now only fraction of the above figures due to reduced run-off and irrigation development upstream; formerly breeding place of several wildfowl species including Tadorna tadorna and Phoenicopterus roseus; habitat of large numbers of wintering wildfowl, particularly in late winter.

B-1 KARGAH LAKE 64° 30'N 69°05'E Category 6.B.a.

Fresh water reservoir for Kabul City of about 150 ha. and at 1800 m. elevation. Used extensively by waterfowl on passage and by small population of several species during winter.

B-2 CHAMAN (Balahissar) 34° 31'N 69°13'E Category 8A.

Fresh water marsh of some 200 ha. in Kabul City limits and again at around 1800 m. elevation. Also used extensively by waterfowl on passage and by small population during winter. Breeding place of Podiceps nigricollis and Aythya ferina. This area has been declared a royal hunting ground.

Both B-1 and B-2 are of great ornithological interest and ideally situated for regular observations.

B-3 BALKH (lake near) 36° 42'N 66°55'E Category 7.B.a.

Lake of about 200 ha. in remote area near ancient city of Balkh.

Reported to hold exceptionally high concentrations of wildfowl species both on passage and throughout winter. Suggested by the Afghan authorities as most suitable site for observatory/ ringing station.

B-4 AMU DARYA (River Oxus) 37°N 68 - 70°E Category 5.A.a.

The reed beds and creeks of the Amu Darya in the Kunduz and Taluqan Districts on the border of the U.S.S.R. are ornithologically unexplored and seldom visited by Afghani sport-shooters. They are nevertheless reputed to be an important wildfowl habitat throughout the year.

Status of wildfowl species

Phoenicopterus roseus: Breeds at Ab-e Istadah and in Seistan.

Anser erythropus: Winters in Seistan.

Anser anser: Winter visitor, passage migrant and, formerly at least, breeding bird in Seistan.

Anser indicus: Passage migrant in Wakhan.

Cygnus cygnus: Former winter visitor to Seistan in small numbers.

Cygnua olor: Former winter visitor to Seistan and breeding recorded.

Tadorna (Casarca) ferruginea: Mainly winter visitor and passage migrant, but breeds also in central highlands of Afghanistan.

Tadorna tadorna: About 100 pairs breed on Ab-e Istadah; a few visit Kargah, but the majority presumably winter in West Pakistan.

Anas angustirostris: Breeds in Russian Turkestan and so possibly in northern Afghanistan; formerly bred in Seistan; twice recently recorded on passage near Kabul.

Anas acuta: Winter visitor and passage migrant.

Anas crecca: Numerous winter visitor and passage migrant.

Anas platyrhynchos: Winter visitor and passage migrant in fair numbers.

Anas strepera: Sparse winter visitor and passage migrant.

Anas penelope: Winter visitor and passage migrant.

Anas querquedula: Passage migrant in small numbers only.

Anas clypeata: Common passage migrant and winter visitor; formerly very common in Seistan.

Netta rufina: Regular but sparse passage migrant; formerly common in Seistan and possibly even resident.

Aythya ferina: Widespread winter visitor and numerous on passage; breeding recorded at Chaman.

Aythya nyroca: Sparse winter visitor and passage migrant.

Aythya fuligula: Sparse winter visitor but common on spring passage.

Nettapus coromandelianus: Recently recorded from Kargah and on the Kabul river both times in August (monsoon period).

Mergus albellus: Winter visitor and passage migrant in small numbers.

Mergus merganser: Breeds in Wakhan and has also been recorded in winter near Kabul.

Mergus serrator: Winter visitor.

Oxyura leucocephala: Formerly believed resident in Seistan; now possibly passage migrant only.

THE WILDFOWL AND WETLAND SITUATION IN WEST PAKISTAN

- by -

C. D. W. Savage

Introduction

West Pakistan is one of the principal wintering grounds of wildfowl in south-west Asia as well as being on flyways to central and southern India. There are many wetlands comparable with the best to be found anywhere in the world, but almost all depend on a variable rainfall or canal water surpluses which also vary from year to year. Thus evaluation and 'ranking' of wetlands in West Pakistan presents special problems.

The northern half of the country, the former Punjab, has been well studied by the writer with the help of a number of other observers. The southern half, the former Sind, and Baluchistan to the west have not been so thoroughly studied due to the fewer observers available. Nevertheless considerable progress has been made since the writer's review of the situation in West Pakistan in 1965 and it is now possible to state with some certainty which wetlands or wetland groups should be included in the MAR List when extended to Asia.

The status and distribution of wildfowl species is summarised from the latest information on record with the Wildfowl Survey.

The general situation for wildfowl in West Pakistan is still favourable. Although there is continually increasing shooting pressure, administration of the Game Laws has recently been tightened up and management of private shooting preserves has provided much needed sanctuary conditions in many parts of the former Sind. The latter, together with the refuge to be found in large lakes and marshes, are essential for the existing status of wildfowl in West Pakistan.

The Wetlands

The following wetlands are suggested for inclusion in the MAR List

for Asia and the Middle East (listed predominantly from north to south but also in order of importance):-

A-1 KHABBAKI LAKE 32°37'N. 72°14'E. Category 7.A.a.

A shallow brackish lake of about 400 ha. at over 700 m. altitude. It supports 3,000 - 10,000 ducks and coots both during passage and in winter. It is also the principal wintering ground in West Pakistan of the Whiteheaded Duck Oxyura leucocephala. and was gazetted a wildfowl sanctuary in 1966 for this reason.

A-2 NAMMAL LAKE 32°40'N. 71°49'E. Category 7.B.a.

A shallow brackish lake of 1,000 - 2,500 ha. with water levels partially controlled by impoundment for irrigation. Although much disturbed this lake carries very large concentrations of wildfowl and coots, particularly during passage.

A-3 KHARRAR JHEEL 30°52'N. 73°32'E. Category 7.A.a.

This is a very shallow lake of 700 - 1,000 ha., fed by springs but having come into existence very recently (1945) through waterlogging. It is now one of the most important wetland habitats in the Punjab not only for wildfowl but for many other species of waterfowl. Flamingoes Phoenicopterus roseus attempted to nest in 1966 for the first time. Also used by the Whiteheaded Duck Oxyura leucocephala.

A-4 GHAUSPUR JHEELS 28°08'N. 69°06'E. Category 7.B.b.

About 600 ha. of highly eutrophic shallow grass and Valisneria swamp, flooded from the Indus for flood control and of local importance for fishing and grazing. 100,000 or more wildfowl and coots are to be found on passage and in winter as well as a wide variety of other waterfowl and birds of prey. Six species of eagles can be seen in a day.

A-5 QAMBAR DHANDS 27°36'N. 67°52'E. Category 8.A.

This group of 'dhands' or shallow marshes cover over 100 sq. km. The majority are managed as private shooting preserves and at times hold several hundred thousand ducks. The kill is relatively small compared with the numbers given refuge and also in some cases fed.

A-6 HAMMAL LAKE 27°35'N. 67°37'E. Category 7.B.b.

This is a seasonal lake on the edge of the foothills which attracts tens of thousand of ducks on passage, particularly Garganey Anas querquedula. It is relatively difficult of access and not much disturbed.

A-7 MANCHAR LAKE 26°25'N. 67°40'E. Category 7.B.a.

Reputedly the largest freshwater lake in the sub-continent, some 100 sq. km. in area. Modification of the habitat about 1947, by construction of floodbunds, has reduced seasonal fluctuations in water level

and caused excessive weed growth. The area is still of great value as a fishery and for reed cutting. There is no doubt that the lake is still used by hundreds of thousands of ducks at times, but it is no longer easy to see them.

A-8 KARA CANAL 26°25'N. 68°52'E. to 27°00'N. 68°55'E. Category 5.a./7.A./8.A.

This is part of an old river course now used as a canal and includes a number of desert 'dhands' in the sand dunes on either side. The area is of very great ornithological interest yet has hardly been explored. Areas of known great importance to wildfowl are Sanghar Jheel and Jamrao Head.

A-9 ROHRI CANAL SEEPAGES 27°30'N. 68°45'E. to 27°25'N. 68°35'E. Category 8.A.

This includes particularly important seepage areas in Khairpur Mirs and Tando Masti Khan. The only recent evidence of breeding of Marbled Teal Anas angustirostris has been from here.

A-10 LADIUN 24°18'N. 68°07'E. Category 8.A.

This is a very large group of private shooting grounds covering about 150 sq. km. of seasonal flooding and shallow dhands often augmented with canal water. Exceptional concentrations of Teal Anas crecca and Pintail Anas acuta are found. The soil is saline/alkaline and mostly not suitable for agriculture.

A-11 SUJJAWAL 24°35'N. 68°08'E. Category 8.A.

This area is very similar to Ladiun but water supplies are more precarious and dhands tend to be more overgrown with Typha and Chara. These areas abound with Ferruginous Duck Aythya nyroca at certain times as well as many other species.

A-12 TANDO BAGO 24°45'N. 68°57'E. Category 8.A.

This area is similar to the last and contiguous. It includes many notable items such as Patt Jheel, Tarai Khar-ro Jheel and Mahboob Shah Jheel.

A-13 MIRPUR SAKRO 24°29'N. 67°25'E. Category 8.A.

This again is an area of outstanding wetlands including Muradani Dhand. An abundance of Typha provides cover for Mallard Anas platyrhynchos, for which the area is particularly important. Several dhanda are managed as shooting preserves for the President of Pakistan.

A-14 KETI BUNDAR 24°08'N. 67°25'E. Category 3.A.

The silt flats at the mouth of the Indus are important roosting areas for Greylag Geese Anser anser and resting places for very large numbers of duck. There are also exceptional concentrations of both forms of Pelican which are trapped in large numbers for their feathers and their fat.

The whole Mouth of the Indus has been little explored and the best area to list has yet to be determined.

B-1 SUM SAKESAR KAHAR 32°33'N. 72°02'E. Category 7.A.a.

Otherwise known as Uchhali Lake, this is very salt and mainly important for its Flamingos Phoenicopterus roseus and Common Shelduck Tadorna tadorna. though large numbers of other wildfowl use the lake on passage and in winter.

B-2 KALAR KAHAR 32°46'N. 72°42'E. Category 7.A.a.

A brackish lake of about 300 ha. which like the other lakes of the Salt Range holds large numbers of ducks of many species, including the Whiteheaded Duck Oxyura leucocephala.

E-3 KHUSHDIL KHAN BUND 30°40'N 64°04'E. Category 6.A./8.A.

Near this large shallow irrigation tank lies the highly eutrophic Malazai marsh which is fed by spring water and remains open when the lake is frozen. The area as a whole is of great interest, and importance, for wildfowl migrating to the lower Indus through Afghanistan. Both Marbled Teal Anas angustirostris and Common Shelduck Tadorna tadorna have bred.

B-4 MARALA HEADPOND 32°40'N. 74°30'E. Category 6.A./5.A.a.

This area includes the Chenab River up to the Indian border and the tributary Monowar Tawi. It is the most important wintering ground of the Barheaded Goose Anser indicus in West Pakistan, besides providing habitat for many species on passage.

B-5 BUDDHI NALLAH 32°14'N. 73°13'E. to 32°32'N. 73°39'E. Category 8.A. (5.A.a.)

An old river course with a chain of marshes which hold large numbers of Mallard Anas platyrhynchos and Pintail Anas acuta in winter. The whole area is important for grazing and reed cutting but is threatened with reclamation.

B-6 SUKH BEAS 30°50'N. 73°55'E. to 31°05'N. 74°30'E. Category 7.A.a. (5.A.a.)

Part of the course of the old River Beas before capture by the Sutlej some 150 years ago. It now consists of a chain of brackish jheels which taken together provide habitat for about 10,000 wildfowl on passage and in winter. Important passage migrants are Garganey Anas querquedula and Ferruginous Duck Aythya nyroca.

B-7 LAL SUHARA 29°22'N. 71°57'E. Category 7.A.B./ 8.A.

Comprises 20-30 sq. km. of fresh marsh flooded from the canal system at times when supply exceeds demand. It is particularly important during the autumn passage when there is no other extensive habitat in the vicinity where wildfowl can rest and recuperate.

B-8 KALRI LAKE 24°56'N. 68°03'E. Category 6.A.

About 35 sq. km. of mostly deep fresh water dam on the site of a former lake. It is important as the wintering place of Tufted Duck Aythya fuligula and other diving ducks. The whole of Kalri Lake is protected, but somewhat disturbed by boating activities.

B-9 HASBRO DHAND 24°49'N. 67°52'E. Category 7.A.a.

A shallow salt lake of about 10 square miles in extent. It is particularly notable for concentration of Flamingo Phoenicopterus roseus, numbering as many as 4,000, as well as large numbers of wild-fowl species.

B-10 HALEJI DHAND 24°48'N. 67°47'E. Category 7.B.a./ 6.A.

A reservoir for Karachi water supply and totally protected and undisturbed. It is some 20 sq. km. in area but does not at present attract the density of wildfowl that are found in other areas. It could be greatly improved by careful management. Spotbill Anas poecilorhyncha nest among the seepages and Cotton Teal Nettapus coromandelianus are to be found amongst the water lilies.

Status of wildfowl species

Phoenicopterus roseus: several thousand present throughout the year but no breeding yet recorded (it does however breed in the Rann of Kutch and also on Lake Ab-e Istadah outside the borders of Pakistan); nesting was however attempted at Kharrar Jheel in 1966. Numbers in Sind are much reduced from former times. The Lesser Flamingo Phoeniconaias minor has not been recorded in West Pakistan for fifty years.

Anser albifrons: one record in last fifty years; rare vagrant.

Anser erythropus: eight seen in last twenty years; rare vagrant.

Anser anser: less than a thousand winter in West Pakistan; numbers have declined in recent years but the increase in the East Punjab (near Delhi) suggests a change in distribution.

Anser indicus: about a thousand winter in West Pakistan; numbers have undoubtedly fallen in recent years, most likely due to refugee settlement on the upper Indus flood plains which were formerly their principal habitat in West Pakistan.

Dendrocygna javanica: found in small flocks throughout the summer on well wooded jheels in southern Sind along the Indus where it breeds. Seldom seen in winter or elsewhere.

Dendrocygna bicolor: no recent records but probably still to be found in the East Nara area; the last influx was recorded in 1930. The distribution of the species throughout the sub-continent has been much reduced in recent years and it is now only plentiful in certain parts of Bengal and lower Assam.

Tadorna ferruginea: 1,000 - 2,000 winter in the Punjab, almost all

believed to be of Russian origin; a few hundred winter in Sind and Baluchistan but there appear to be of Iranian origin. No breeding recorded.

Tadorna tadorna: 25-50 winter in the Punjab and nearly a hundred in lower Sind. Some no doubt visit Pakistan from Afghanistan (Ab-e Istadah); there is one breeding record from Khushdil Khan Bund.

Anas angustirostris: small numbers are still to be found in suitable overgrown jheels of Sind but numbers have been much reduced in the last fifty years. Resident in Sind and occasional vagrant in the Punjab.

Anas acuta: tens of thousands winter in Pakistan, mainly in the south.

Anas formosa: twice recorded in West Pakistan; rare vagrant (as also in northern India).

Anas poecilorhyncha: found in summer along the less wooded areas of the lower Indus where it breeds. The majority leave in autumn and return in spring. Numbers and distribution much reduced this century.

Anas platyrhynchos: several hundred thousand winter in West Pakistan in suitable conditions, mainly in the south. There has certainly been some reduction in numbers in recent years.

Anas strepera: a few thousand only winter in West Pakistan today and mainly in the south. Formerly the most common surface feeding duck, numbers declined steeply in the 1930's and have certainly still been declining during the last ten years.

Anas falcata: two records in the last twenty years; rare vagrant.

Anas penelope: about 10,000 - 20,000 winter in West Pakistan in suitable areas, mainly in the south. Although numbers have dropped it is still one of the commonest duck.

Anas querquedula: very numerous on passage only.

Anas clypeata: very numerous on passage; 10,000 - 20,000 winter throughout the country, but mainly in the south.

Netta rufina: a few hundred winter in West Pakistan; there has been a marked decrease this century, mostly prior to 1940.

Aythya ferina: tens of thousands winter in West Pakistan in suitable places, but predominantly in the south.

Aythya nyroca: numerous on passage; a few thousand winter in lower Sind.

Aythya fuligula: several hundred winter regularly in West Pakistan but it is doubtful if the numbers much exceed 1,000 in all. Their numbers appear to be nearly constant.

Aythya marila: only two certain records in the last twenty years; rare vagrant.

Nettapus coromandelianus: occasional influxes of small numbers in the north. In the south only found in small pockets in places like Haleji Dhand.

Sarkidiornis melanotus: single vagrants found most years both in southern Sind and in the norths

(Clangula hyemalis: not recorded in the last fifty years.)

Bucephala clangula: not recently recorded from west Pakistan, but occurs still in Kashmir.

Mergus albellus: 200 - 300 winter in west Pakistan. On passage they congregate on Mammal Lake.

Mergus merganser: 10 - 20 winter in West Pakistan, usually at Haleji, Hadero and Kalri Lakes.

Mergus serrator: three records in the last twelve years; rare vagrant.

Oxyura leucocephala: around 1,000 winter in West Pakistan today. Numbers have increased greatly in last ten years, prior to which the wintering population appears to have been of the order of 25 - 50 only.

THE WILDFOWL AND WETLAND SITUATION IN IRAQ

- by -

C. D. W. Savage

Introduction

Iraq is without doubt the most important wintering ground for wildfowl in the Middle East, yet so far the least studied. At the same time river control projects in Iraq are likely to modify present habitats profoundly over the next twenty years and there is no time to be lost in assessing their value and planning management of the most important wetlands to mitigate the effects of changes.

The object of the present paper is to summarise information available from the literature (see References) and the comments of residents in Iraq. The interpretation however is entirely the writer's and is highly tentative in view of the paucity of the data. Nevertheless as it is essential to identify the wetlands of international importance without delay, a list has been prepared of those which it is considered should be included in the MAR List when extended to Asia.

The general situation at the present time is still favourable to wildfowl. There is a comprehensive game law which the government are enforcing as far as possible and market hunting has recently been prohibited. Sport shooting is subject to a moratorium, but there is no

control at present of villagers hunting for their own consumption.

Wetland List

The following wetlands are suggested for inclusion in the MAR List for Asia and the Middle East (listed predominately from north to south, but A-1 and A-2 are in order of importance):-

A-1 HAUR AL HAWAIZAH 31°40'N. 47°35'E. Category 7.B./8.A.

A marsh of some 900 sq. km. fed by flood waters of the Tigris with large areas of open water as well as reed beds and providing wintering habitats for some of the largest concentrations of wildfowl in the world.

A-2 HAUR AS SUWEICHA 32°35'N. 43°35'E. Category 7.E.b.

The 'Haur' as such has been partially drained since 1945, but there are still 100 sq. km. or more of exceptional goose grounds with shallow depressions filled with rain water in winter. The area probably holds one of the highest concentrations of geese in Asia or the Middle East, quite apart from many species of duck, particularly the Garganey Anas querquedula on passage.

A-3 TIGRIS NEAR MOSUL 36°20'N. 43°08'E. Category 5.A.a.

Wintering ground of many species of ducks and Greylag Geese Anser anser, but it particularly important for wildfowl on passage especially Garganey Anas querquedula and Tufted Duck Aythya fuligula. The Ruddy Shelduck Tadorna ferruginea is unusually common and breeds near Enzala within this area.

A-4 WADI THARTHAR 33°55'N. 43°15'E. Category 7.A.a.

A large natural depression and former salt lake which is now used for flood relief. With dilution of the salt, vegetation is becoming established and huge numbers of wildfowl are reported to be wintering in the area. With careful management the potential of this area is very great and could help offset possible future adverse modification of habitats elsewhere.

A-5 KABBANIYA LAKE 33°20'N. 43°20'E. Category 7.B.a.

Another lake used for flood relief, also an important fishery. Sawbills Mergus sp. are to be found here and large numbers of many species of ducks. The Ruddy Shelduck Tadorna ferruginea breeds-

A-6 KUT-SUWEIRA-SHATT AL GASS 32°05'N. 46°00'E. Category 5.A.a.

This is a complex of habitats: river, flood spills and ox-bow lake (Suweira). Mallard Anas platyrhynchos, are particularly common, but most species of surface feeders Anas sp. and diving ducks Aythya sp. occur. Pintail Anas acuta and Gadwall Anas strepera are numerous on passage. The Whiteheaded Duck Oxyura leucocephala was found here by Thornhill (Ticehurst 1921)

A-7 HILLA MARSHES 32°30'N. 44°30'E. Category 7.B./ 8.A.

Marshes around Hilla hold large numbers of wildfowl in winter.

A-8 BANI LAM MARSHES + 31°55'N. 47°30'E. Category 7.E./ 8.A.

These marshes lie behind Amara on the left bank of the Tigris and are particularly important for Greylag Anser anser, Lesser Whitefront Anser erythropus and the Ruddy Shelduck Tadorna ferruginea. The Marbled Teal Anas angustirostris breeds.

A-9 SUWEID AND SUDAN MARSHES 31°45'N. 47°30'E. Category 7.B./8.A.

These marshes are a continuation of Haur al Hawaizah and the Bani Lam marshes respectively. They are partly permanent and partly seasonal.

A-10 FERRAIGAT MARSHES 31°30'N. 47°10'E. Category 7.B./8.A.

A large complex of marshes flooded from the Tigris, with huge concentrations of wildfowl in winter months. Thesiger (1964) noted that 'occasional Greylag remain to breed'.

A-11 NAHRSABLA 31°30'N. 47°35'E. Category 8.A.

An area of predominately seasonal marsh on the borders of Iran. It is known to be the winter habitat of large numbers of duck species as well as Lesser Whitefront Anser erythropus.

A-12 SHATRA MARSHES 31°20'N. 46°15'E. Category 7.B./8.A.

This important area includes the Haur al Ghamuga.

A-13 AL AZAIR 31°17'N. 47°23'E. Category 7.B./8.A.

This area of seasonal and permanent swamp fed from the Tigris was formerly the principal known haunt of the Whiteheaded Duck Oxyura leucocephala in Iraq.

A-14 UM BINNI MARSHES 31°15'N. 47°05'E. Category 7.B./8.A.

These predominately permanent marshes are an important habitat for the Common Pochard Aythya ferina. Marbled Teal Anas angustirostris are present in summer.

A-15 FARTUS MARSHES 31°10'N. 46°55'E. Category 7.B./ 8.A.

This area which includes the Sabil al Uwaidiye, is the habitat of large numbers of Pochard Aythya ferina and geese Anser sp. Marbled Teal Anas angustirostris are present in summer.

+ Note: The Tigris-Euphrates marshes cover 15,000 sq. tan. The most important sections listed here are identified by the group name of the local inhabitants. The geographical coordinates indicate the approximate centre of each section.

A-16 HAUR AZ ZIKRI 31°10'N. 47°10'E. Category 7.B. /8.A.

Another area of predominately permanent marsh and open lake which is the winter habitat of huge numbers of wildfowl.

A-17 NASIRIYA MARSHES 31°10'N. 46°10'E. Category 7.B. /8.A.

Permanent and temporary marshes flooded from the Euphrates which are important wildfowl habitats.

A-18 CHABAISH MARSHES 31°00'N. 47°00'E. Category 7.B./8.A.

Permanent and temporary marsh including Birkat Baghdad, flooded both from Tigris and Euphrates.

A-19 AHL JAZAIR MARSHES 31°00'N. 47°15'E. Category 7.B./8.A.

These are the extensive marshes on the right bank of the Euphrates before its confluence with the Tigris.

A-20 HAUR AL HAMMAR 30°40'N. 47°00'E. Category 7.B.

Parts of this huge lake provide winter quarters for large numbers of the majority of species visiting Iraq. Buxton (see Ticehurst 1922) obtained goslings of the Greylag Anser anser here.

A-21 SHATT AL ARAB MARSHES 31°00'N. 47°30'E. to 29°55'N.
48°30'E. Category 7.B./8.A./ 3.A.

These very important marshes lie along the Shatt al Arab especially between Qurnah and Basra including the Haur ash Shaibah 15 km. north of Basra, Qarmat Ali and Khamisiyah. Greylag Anser anser winter in flocks of hundreds, also large numbers of many species of duck, particularly mallard Anas platyrhynchos and Common Teal Anas crecca. The Marbled Teal occurs in summer. The lower marshes below Basra are presumably changing their character as less fresh water is now reaching the sea and there is increasing encroachment of sea water.

B-1 GREAT ZAB VALLEY 36°00'N. 43°30'E. Category 5.A.a.

Includes wetland habitats near al Hamra, Mizabil Kabir, Eski Kalek and Shinnaf. It appears to be important for Common Teal Anas crecca, Pochard Aythya ferina and Gadwall Anas strepera on passage. The Marbled Teal Anas angustirostris is also found.

B-2 LITTLE ZAB VALLEY 35°15'N. 43°55'E. Category 5.A.a.

Includes the Huwajah wetland in Kirkuk District. Flamingo Phoenicopterus roseus and Gadwall Anas strepera occur on passage, where Common Teal Anas crecca winter by the thousand.

B-3 DIYALA RIVER BELOW WEIR 34°00'N. 44°55'E. Category 5.A.a.

This area includes Abi Jasrah. Common Shelduck Tadorna tadorna are found.

B-4 HINDIYAH 32°35'N. 44°10'E Category 5.A.a.

Siddat al Hindiyah is a wintering area of Mallard Anas platyrhynchos. Teal Anas crecca, Shoveler Anas clypeata and Garganey Anas querquedula. Marbled Teal Anas angustirostris breed.

B-5 SHATT AL GHARRAF 32°30'N. 45°50'E. to 31°25'N. 46°10'E.
Category 7.B. /8.A.

Consists of a number of smaller habitats between Kut and Shatra and includes Al Hazz. This area today is of particular importance for the Marbled Teal Anas angustirostris.

B-6 AL FAO 29°55'N. 48°30'E. Category 3.A.

At the mouth of the Shatt al Arab and notable as a Flamingo Phoenicopterus roseus breeding place, as well as for its sea birds.

Status of wildfowl species

It must be emphasised again that much of the information on which the following is based is very old and new field observations are urgently required:

Phoenicopterus roseus: widespread throughout the country and not uncommon. Breeding recorded from Al Fao but other breeding places are no doubt yet to be discovered.

Branta ruficollis: reliable observations suggest that several hundred winter regularly in the Suweicha area, confirming a rather indefinite statement by Ticehurst (1922).

Anser albifrons : common (second only to the Greylag), particularly in the Suweicha area and near Amara.

Anser erythropus: less common than A. albifrons but found in quite large numbers in the Suweicha area.

Anser anser: abundant particularly in Suweicha area, around Kut and in the southern marshes. Small numbers remain to breed in several areas mentioned above.

Cygnus olor / Cygnus sp.: very occasional records and mostly of immature birds. Only one specimen positively identified as Cygnus olor.

Tadorna ferruginea: widespread in fair numbers, mainly along the Tigris. Breeds in suitable areas.

Tadorna tadorna: not common, and possibly not more than a few hundred winter in Iraq. No evidence of breeding. Since it has been recorded from Mosul in the north a link with the breeding colony on Lake Rezaieyh, Iran, seems possible.

Anas angustirostris: widely distributed and still not uncommon, but status difficult to determine. Breeds in suitable areas.

Anas acuta: passage migrant in the north but widespread and abundant on the wetlands of the south.

Anas crecca: widespread and abundant winter visitor.

Anas platyrhynchos: widespread and abundant winter visitor.

Anas strepera: passage migrant in the north and not uncommon winter visitor to the south. Apparently declined in numbers between 1920 and 1945, but recent observations show that it abounds in some areas, so the decline has not been as serious as in other parts of south-west Asia and the Middle East.

Anas falcata: one record only, in 1916.

Anas penelope: quite abundant winter visitor but not widespread.

Anas querquedula: Passage migrant in the north and winter visitor in small numbers in the south. Recent observations of the species on passage over the Red Sea suggest that Iraq is on a migration route to Tropical Africa, where it winters in large numbers.

Anas clypeata: widespread and most abundant of the winter visitors.

Netta rufina: winter visitor in small numbers, mainly to the southern marshes.

Aythya ferina: widespread and abundant winter visitor.

Aythya nyroca: a winter visitor in fair numbers to the southern marshes.

Aythya fuligula: widespread winter visitor but in small numbers.

Aythya marila: two records only: vagrant.

Eucephala clangula: uncommon winter visitor to the large rivers; only recorded by Ticehurst (1922).

Mergus albellus: winter visitor in small numbers.

Mergus merganser: rare winter visitor.

Mergus serrator: rare winter visitor.

Oxyura leucocephala: formerly rare winter visitor; only records are those given by Ticehurst (1922).

THE WILDFOWL AND WETLAND SITUATION IN THE LEVANT

- by -

G. D. W. Savage

Introduction

Information on the wildfowl and wetlands of the Levant is extremely sparse compared with other areas of the region. Intense ornithological activity in the area seems to have been confined mainly to spring and summer months. This Paper is therefore based on the fragmentary literature, supplemented by correspondence with two ornithologists with knowledge of parts of the area (R.S.R. Fitter and P.A.D. Hollom) as well as by the writer's professional colleague (C.H. Swann) who has made local enquiries in Syria. The justification for this Paper is that by setting out the meagre information available it is possible that others may be encouraged to fill in the details.

In general the wildfowl populations visiting the Levant are on passage to Egypt and African wintering grounds. Most of the wetlands are highly seasonal and ephemeral being sumps for local drainage systems. The few exceptions which have some permanent water do however attract wintering birds and, in the case of the remoter areas of Syria, the numbers of geese and duck appear to amount to important dimensions.

The area defined as 'the Levant'¹ for the purposes of this Paper includes Syria, the Lebanon, Jordan and Israel.

Wetland List

The following wetlands are suggested for inclusion in the MAR List for Asia and the Middle East on the basis of present information (those marked + urgently need further assessment):-

A-1 JABBOUL (Syria) 36°05'N. 37°30'E. Category 7.A.a.

A salt lake with diameter of several miles in winter, but very largely drying out in summer and having little or no peripheral vegetation. Certainly of importance to waders, but local opinion is divided on the numbers of wildfowl using it in winter.

A-2 AL JAZIRAH + (Syria) 35°N. 41°E.

This area includes a huge tract of seasonally flooded land north of the Euphrates near the Iraq border. Hunters at Raqqa state that this area holds great concentrations of geese and ducks in winter (as indeed one might expect), but actual ornithological evidence is lacking.

A-3 ALI BAJILYAH + (Syria) 36°30'N. 39°E.

An area of salt and fresh marshes near the river Balikh, some " 65 miles north of Raqqa". The area cannot be precisely located from this description but it is reported to have ducks all the year round and large numbers in winter.

A-4 WADI ER RADD + (Syria) 36°35'N. 41°30'E.

A large area of seasonal flooded land near El Qamishliye. It is known to attract large numbers of duck on passage, but its importance as a wintering area is uncertain.

A-5 HULEH RESERVE (Israel) 33°05'N. 35°36'E.

Freshwater marsh with open water and papyrus beds. Breeding area for Mallard, Purple and Grey Herons and Common Tern.

A-6 AZRAQ OASIS (Jordan) 31°50'N. 36°50'E.

This relatively small area is of great biological interest, but its winter use by wildfowl has not been studied. It is reported however that large numbers of duck use the marshes on passage and that quite large numbers do in fact winter.

B-1 EIN FESHKA + (Jordan) 31°37'N. 35°38'E.

This is a small marsh at the head of the Dead Sea near the outfall of the River Jordan. It is reported to be of great ornithological interest and used by wildfowl on passage. Its importance in winter is unknown.

Status of wildfowl species

The information summarised below is based on the extremely meagre published information: -

Phoenicopterus roseus: apparently a rare straggler today though formerly numerous. It should be noted however that 3 - 5,000 have been observed regularly in Cyprus during winter months and that the breeding or even summer distribution of this population is not known.

(Branta ruficollis: not recorded, but likely to occur in Syria).

(Anser fabalis: this species used to occur occasionally in Palestine and there have been two records in Cyprus).

Anser albifrons: it seems likely that it is this species which occurs in the Al Jazirah area. There is however only one record for the Lebanon, though the species has been quite often recorded from Cyprus.

(Alopochen aegyptiacus: formerly found in Palestine; occasionally in Cyprus).

Tadorna ferruginea: resident in parts of the Dead Sea Basin and in parts of Syria.

Tadorna tadorna: occasional winter visitor to Israel, Jordan and Syria.

(Anas angustirostris: no records, but as it breeds on Lake Amik it is likely to be found in Syria in suitable circumstances).

Anas acuta: common passage migrant.

Anas crecca: mainly passage migrant and winter visitor but believed to breed.

Anas platyrhynchos: passage migrant and winter visitor.

Anas strepera: passage migrant and winter visitor, but numbers much reduced in recent years.

Anas penelope: passage migrant and winter visitor.

Anas querquedula: passage migrant in small numbers.

Anas clypeata: passage migrant and winter visitor.

Netta rufina: probably occasional winter visitor or in small numbers only.

Aythya ferina: formerly described as by far the commonest duck throughout the winter. Probably still common winter visitor to suitable areas where undisturbed.

Aythya nyroca: passage migrant (breeds on Lake Amik).

Aythya fuligula: passage migrant and possibly winters in suitable areas.

Aythya marila: winter visitor to coastal waters.

Bucephala clangula: winter visitor to Syria and coastal waters.

Melanitta fusca: sporadic winter visitor to coastal waters.

(Oxyura leucocephala: formerly bred at Lake Huleh; no recent records).

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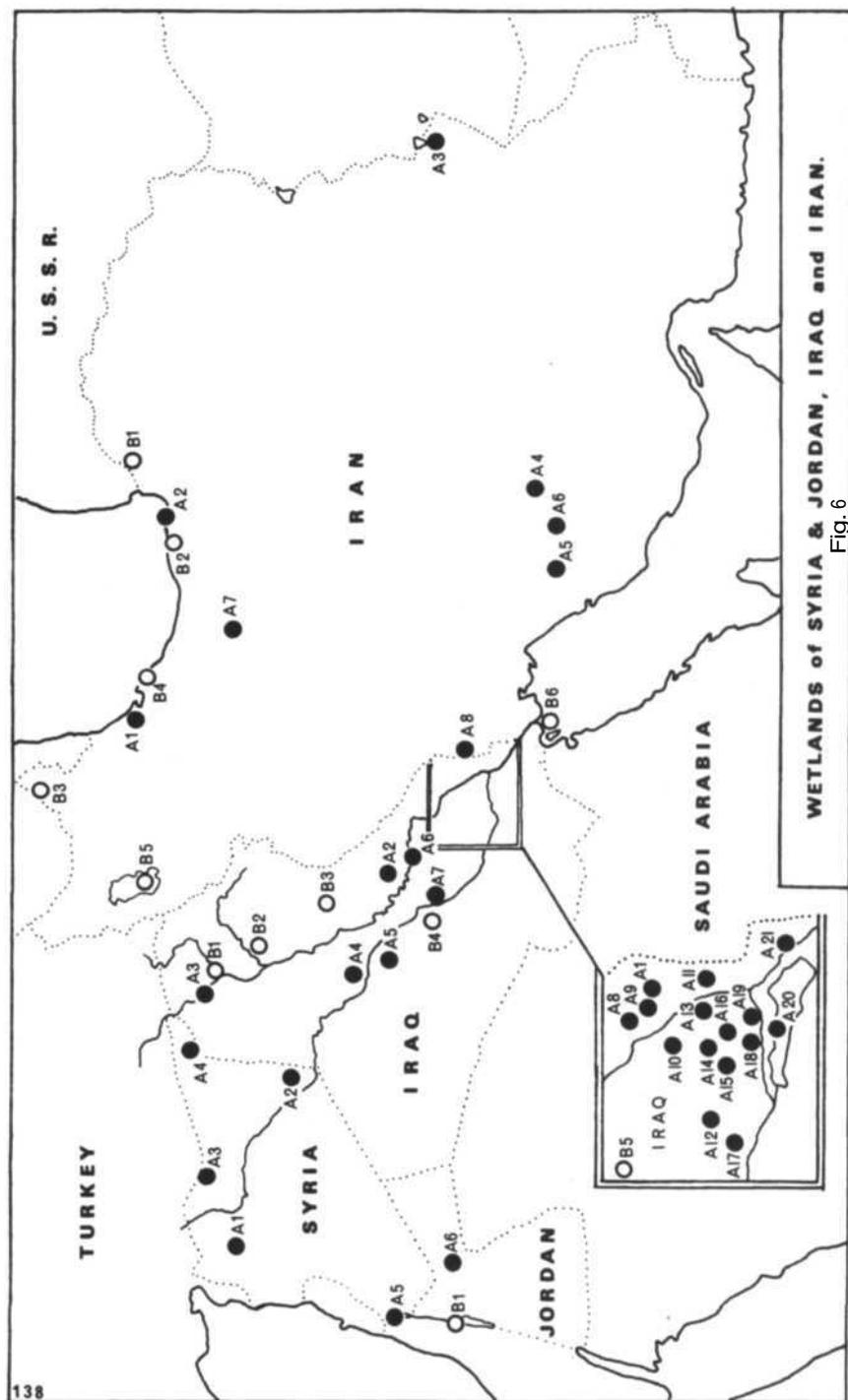


Fig.6

WETLANDS of SYRIA & JORDAN, IRAQ and IRAN.

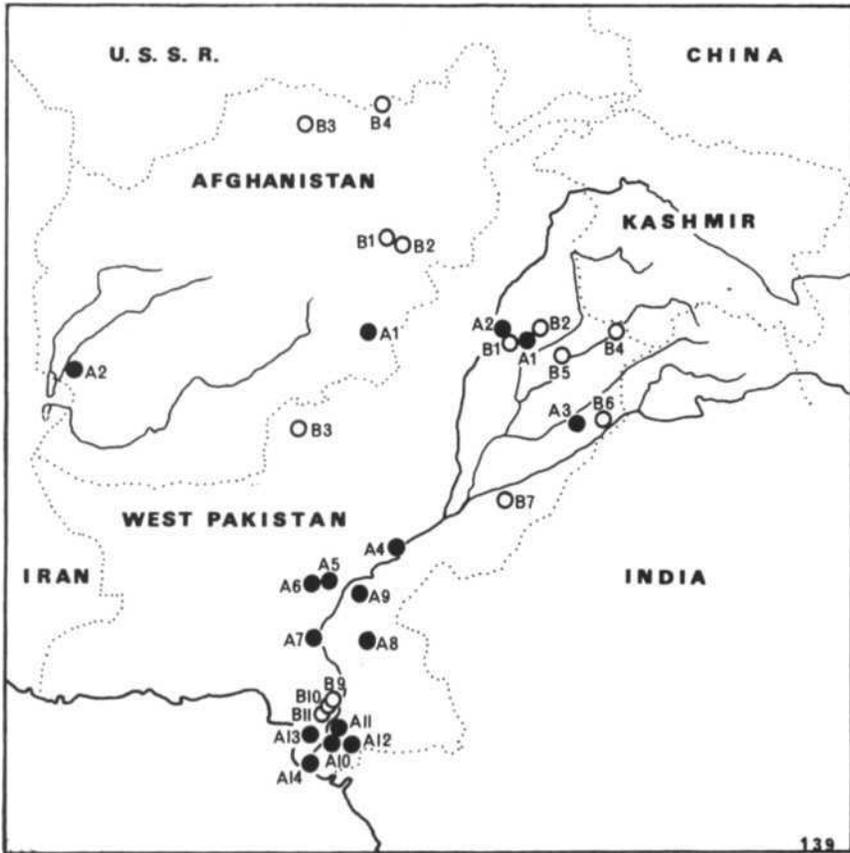


Fig. 7 . Wetlands in Afghanistan and West Pakistan

THE HYDROBIOLOGY OF LAKE NIRIZ, IRAN.

- by -

Dr. H. Löffler

Introduction

Arid zone inland waters have received considerable attention since the first important studies (Decksbach 1929, Hutchinson 1937, Worthington & Worthington 1933, Beadle 1943) were carried out. More recently interest has concentrated mainly on African (e.g. Elster & Vollenweider 1961, Tailing 1965 a, b) and North American (e.g. Anderson 1958) arid zones, whereas outside the Soviet Union relatively little work has been done in Asia (Mümann 1960, Löffler 1961 etc.), let alone in Australia and South America.

The essential features of arid zone lakes whether in arctic or euendoreic zones are wellknown. If not occupying a graben they tend to be shallow, if not fed by permanent springs they are highly astatic and in most cases they are of the closed type. The latter are of great interest because of their variety of saline conditions, both thalassohaline and athalassohaline. In seasonal and perennial astatic closed lakes a more or less distinct rhythm in salinity can be observed, the maximum concentration being either at saturation level or far below it, even where the lake may dry out totally. There are some remarkable examples of lakes (Hamun in Iran and Tchad) which gain an effluent to an adjacent basin and thus become diluted over a period of years, the range of salinity concentrations during an annual cycle collapsing to a negligible magnitude during the first years of this process.

The salinity cycles become even more complicated in lakes which tend to have different concentrations in various parts. Normally this is due to an inflow, the concentration increasing towards the opposite end of the lake. Such an increase may be gradual if a long-extended lake basin, the main wind direction, etc., favour it. Lake Balkhash is a wellknown example; however Lake Niriz in Iran is probably the most remarkable one. Its range of different salinities and distribution of aquatic animals has been described in a paper (Löffler 1959) in which part of the lake was recommended for conservation because of its extraordinary features. Some of the essential results obtained during two investigation periods and some further information gathered recently will be presented here.

Morphology and lake history

In size Lake Niriz ranks third among Iranian lakes and varies between approximately 1600 and 2400 sq. km. At present the lake is divided into two sections - a northern one, Tashk Lake, and a southern one of the same name as the whole lake (other names are also used but far less frequently). Tashk Lake comprises about a third of the whole lake area and is occasionally connected with the southern lake basin at its south-west end. The lake undoubtedly has had the form of a ring during times of high water level, though evidence for this depends on distinct signs found only 3 m.



Fig. 8. Lake Niriz, photographed from a Gemini spacecraft, 1965.
The distribution of the water and salt-flats is easily seen.
Scale approx. 1:575,000.

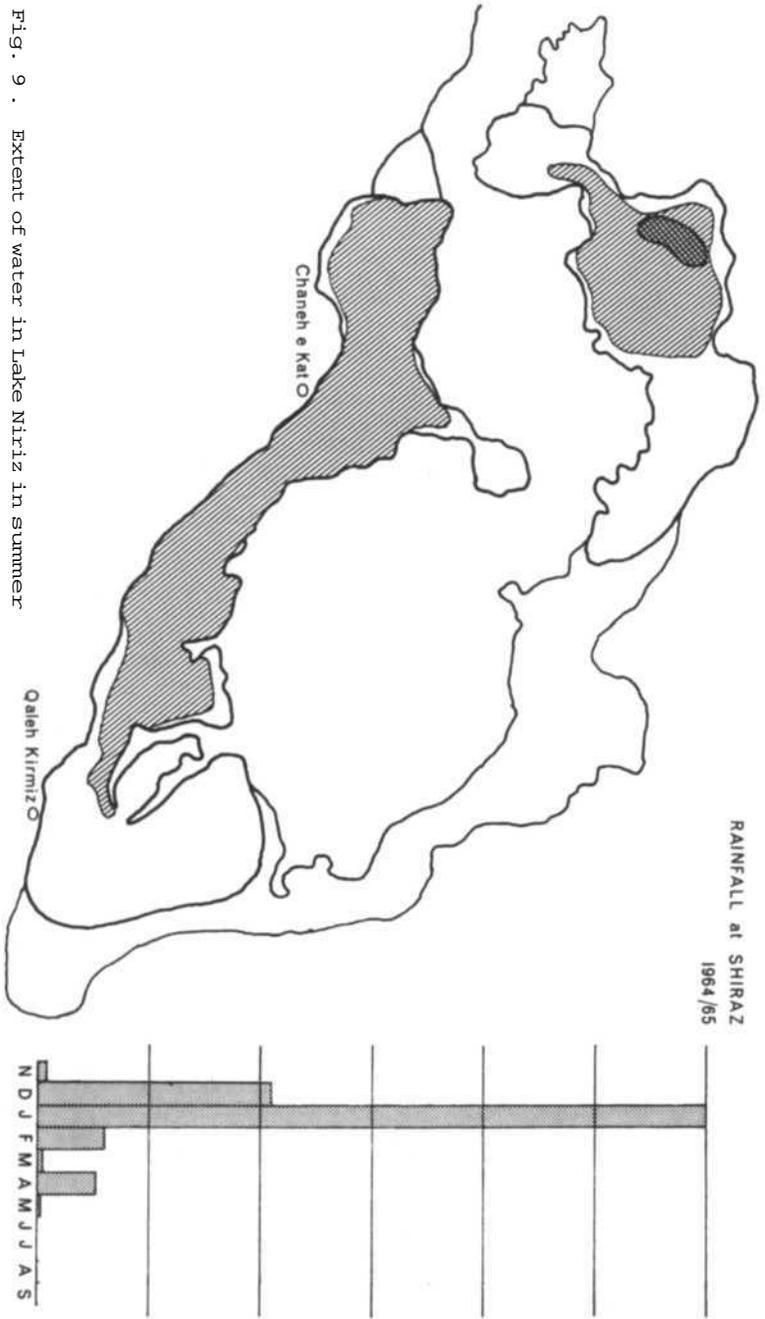


Fig. 9 . Extent of water in Lake Urmia in summer 1965, as shown in a photograph from Gemini spacecraft. The cross-hatching indicates the extent of water in 1933 according to Gray, 1950.

above the water level of June 1956. At that time the maximum depth did not exceed 1.1 m.; however it certainly increases considerably during the winter period when most of the precipitation occurs. There is very little information as to the extent to which the irrigation systems in the Kur River valley have been influencing the situation since historical times (when Persepolis played an important role in this connection), although this river is the main source of water and drains most of the 26,500 sq. km. catchment area of the lake. Another problem still unsolved is the possible existence of a former effluent, probably in the area of Khir at the south-east end of the lake. The relatively low salt content of modern landlocked Lake Niriz is almost convincing evidence for it, though at present the difference in the levels concerned is about 40m.

As mentioned above, Lake Niriz is highly astatic and probably dries out completely during very dry years, though only Gray (1950) has recorded such a condition for the whole lake as having occurred in 1933. At that time only Tashk Lake did in fact contain some water, near the Gomun springs. However no details about this desiccation were given. Lovett (1872), to whom the southern section was known, reported it to be totally dry (probably December 1871) "owing to its being the third rainless season". Abbott (1855) visited the lake in February 1850 when he observed a low water level in the southern lake section.

The first report about both lake sections was given by wells (1883) who travelled around the lake from 30 April - 7 May 1881. He also observed a connection between Tashk Lake and Lake Niriz at their western ends. According to my own observations both lake parts contained some water during the summers of 1949 and 1956. However they may have been dry later in the autumn. Evidence of permanent water in both lake sections throughout the summer was finally obtained in 1965, when photographs were taken in the course of the Gemini project. Fig. 9 shows the extent of water according to observations of different authors and the Gemini photograph (Fig. 8). Rainfall data from Shiraz are presented in Fig. 9 as well; however they are only of slight information value since the data for the mountainous parts of the catchment areas were not available.

Temperature and chemistry

At an altitude of 1525 m. Lake Niriz lies just above the palm limit and theoretically could be influenced by frost periods during winter. However none in fact have been recorded. During summer temperatures recorded in the lake exceed 30°C. and may reach 40°C. in very shallow parts. A striking greenhouse effect has been observed in Tashk Lake where Gomun River (fed by the springs mentioned previously) enters the lake. However, the most notable feature of Lake Niriz is its extraordinary range of salinities especially in the southern basin. Fig. 11 presents some of the Cl-values obtained in 1956. Fig. 10 shows the values for conductivity, total hardness, alkalinity, pH and SiO₂ for the southern basin observed at the same time. At this period, therefore, the southern basin was oligohaline in its western and hyperhaline in its eastern sector. In 1949 the whole scale was shifted much more towards the east, though the water level was much lower (Fig. 11). Like the majority of Iranian salt lakes, Lake Niriz is thasassohaline and has comparatively low alkalinity values. The Kur River carries fresh water whereas other small

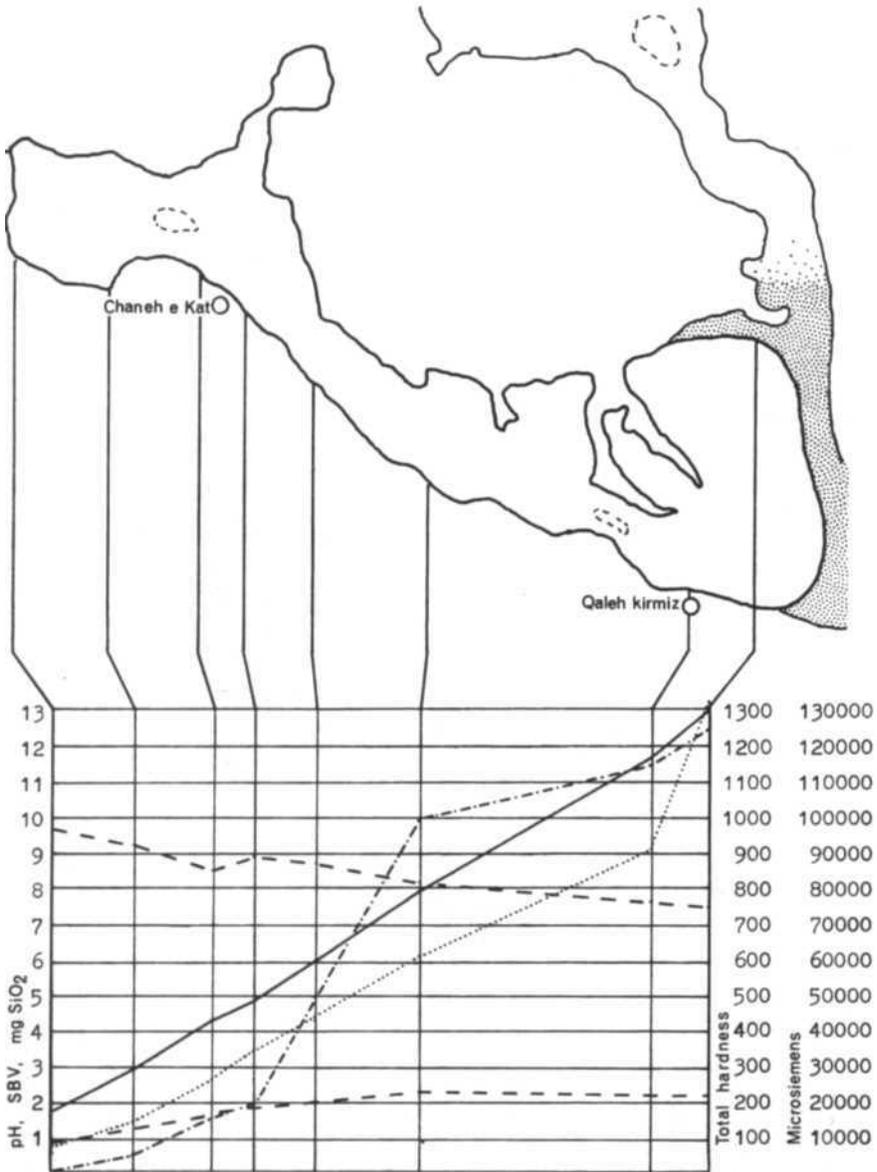


Fig. 10. Conductivity, alkalinity, total hardness, pH and SiO₂ in Lake Niriz

- conductivity in microsiemens (18°C).
- - - pH and alkalinity.
- total hardness in german degrees.
- - - - mg SiO₂.

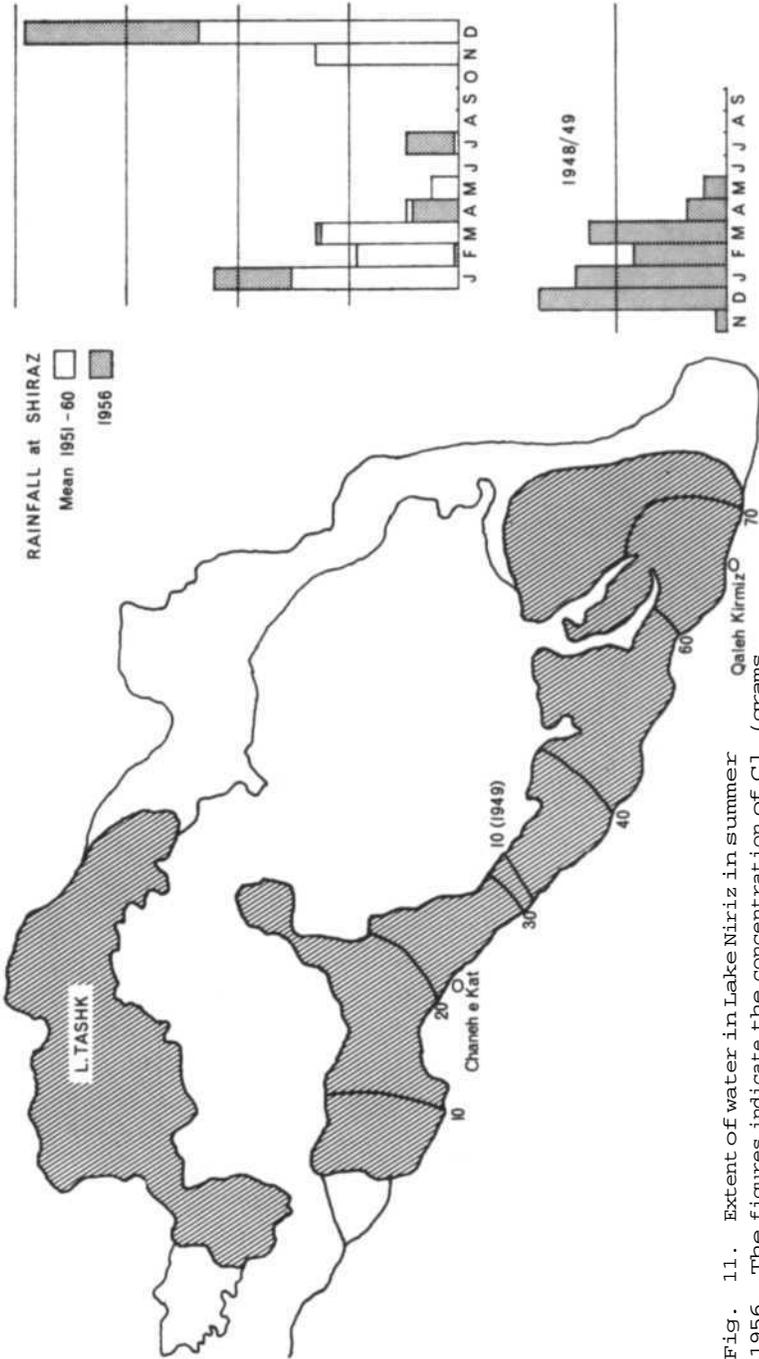


Fig. 11. Extent of water in Lake Niriz in summer 1956. The figures indicate the concentration of Cl (grams per litre). Lake Tashk has a concentration ranging between 39 and 52 gms. per litre. In summer 1949 both basins contained water, but the level was much lower.

inflows, including the Gomun springs, are all oligohaline: the question whether they alone are responsible for the composition of salts present is not yet settled. Salt deposits observed by Gray (1950) may also be partly responsible. It is highly desirable to learn more about the development of salinity in Lake Niriz by means of cores taken in various parts of the lake. Since the distribution of higher vegetation such as Ruppia, Althenia, Chara etc. throughout the lake is directly affected by salinity, the values for oxygen and their daily range in various sectors show a distinct correlation with salinity as well.

Lake organisms

Among phytoplankton diatoms were most significant during the time of investigation in 1956, Nitzschia loffleri being the predominant species in hyperhaline sectors. Most of the lake - especially its western area - is covered with a luxuriant flora consisting of Chara canescens, Lamprothamnium aragonensis, Ruppia maritima and Althenia filiformis. Phragmites belts are restricted mainly to the mouth of Kur River and Gomun springs, their extent being very much dependent on the salinity conditions. No work so far has been carried out on primary production.

In Tashk Lake dense populations of the ciliat Fabrea salina were found in 1956, whereas foraminifera Streblus beccarii were abundant in oligohaline areas and inflows of the lake; however their cases can be found almost everywhere in the lake. Flagellata probably constitute most of the nanoplankton. Brachionus plicatilis and Hexartha fennica are the most typical rotifers in both lakes; many other species, however, have been found. Besides ostracods, nematods form the main bulk of the bottom fauna; they are abundant in Lake Niriz near Qaleh Kirmiz (80 specimens/100 sq. cm.). In bottom material, moreover, shells of Hydrobia acuta can be found almost everywhere though living animals were obtained only in a small stream near Chan-e Kat. No evidence of living specimens from the lake itself has yet been found. Molluscs collected in the catchment area have been described by Edlauer (1957) and are listed in Löffler (1959). The distribution of Artemia salina, copepods and ostracods in 1956 shows a distinct correlation to salinity and is shown in Figs. 12 and 13. In 1949 Diaptomus salinus occurred far further east than in 1956, due to lower salt content. Furthermore a comparison of the distribution of the different species in the northern and southern lake areas shows a striking conformity of salinity ranges preferred by them. In 1956 chironomid larvae occurred mainly in the western sector of Lake Niriz, but it is very likely that they are present throughout the lake at times of lower salinity.

The salt shores especially in the east of Lake Niriz are densely populated by the beetle genera Dyschirius and Bledius and in hyperhaline lake sections by larvae of Ochthebius sp. as well as larvae of different diptera. Only one species of fish Aphanius sophiaae. has been recorded so far and collected in all parts of the lake and the lower sections of its inflows. These fish were heavily affected by the grazing activity of Phenacoperus ruber in sapropelic muds of Tashk Lake where the Gomun River enters. The mud was stirred up and H₂S, CO₂ and an unknown amount of CH₄ entered the water and the fishes present quickly died from suffocation and thus became an easy prey for the herons which took advantage of this opportunity. A strikingly similar technique is used in Oasis

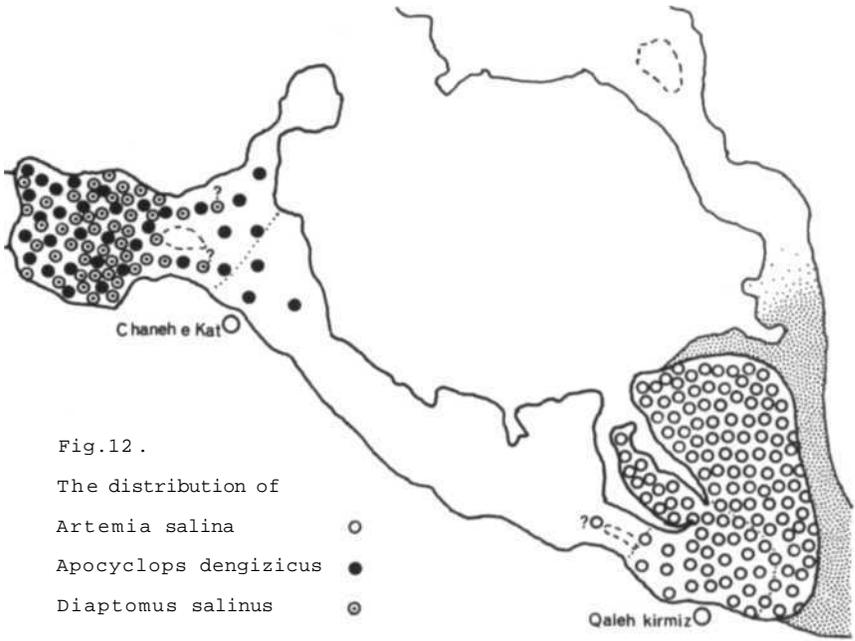


Fig.12 .
 The distribution of
Artemia salina ○
Apocyclops dengizicus ●
Diaptomus salinus ⊙

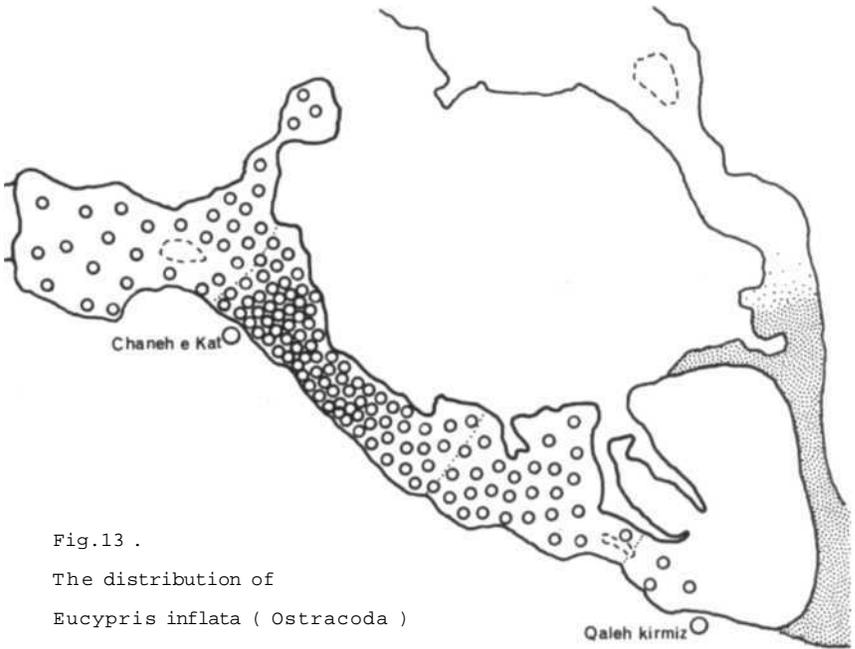


Fig.13 .
 The distribution of
Eucypris inflata (Ostracoda)

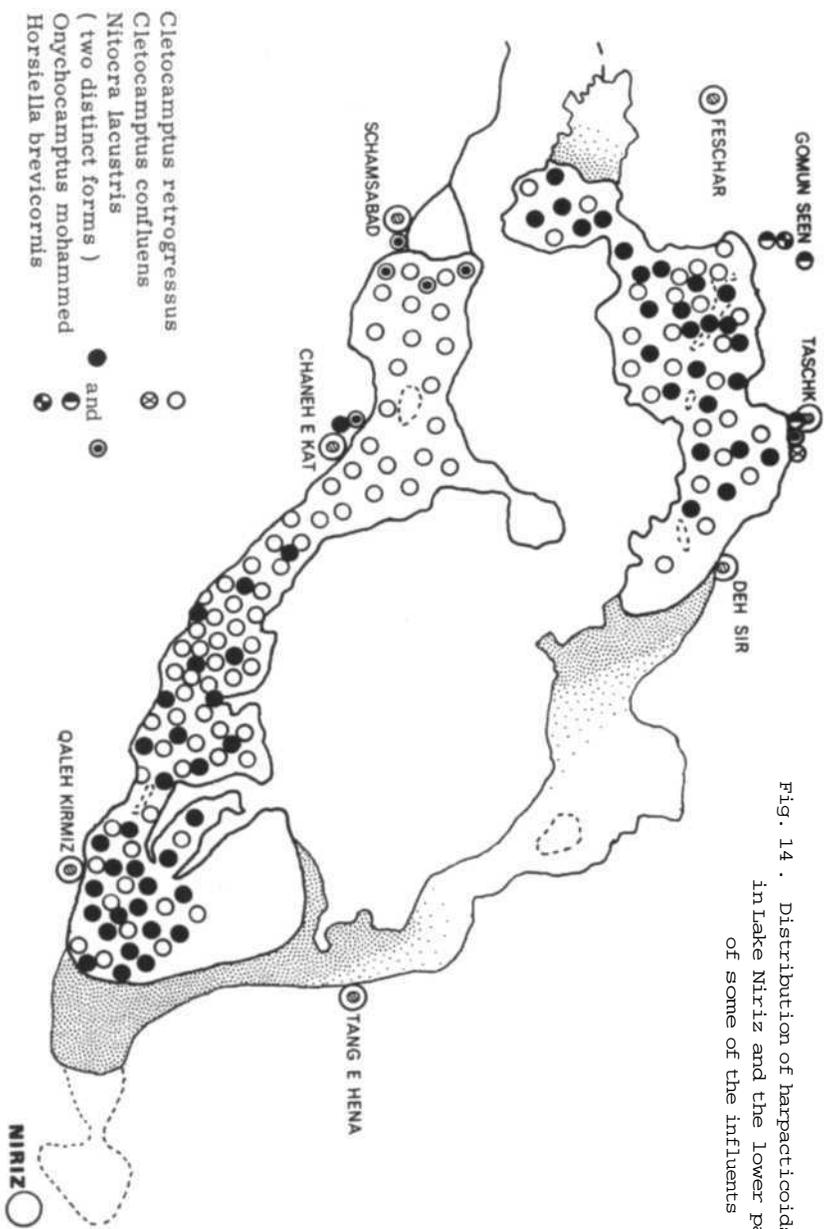


Fig. 14 . Distribution of harpacticoids in Lake Nairiz and the lower part of some of the influents

Fayum (Egypt), where man employs this mud stirring method for fishing.

Lake Niriz, especially the Gomun region, is noted for its waterfowl. Some observations made in this respect have been published (Löffler 1958) and a detailed report by Mr. Cornwallis on the ornithology of the Lake Niriz region follows. His Paper also takes up the project for establishing a protected area in the Gomun region proposed some years ago (Löffler 1959). There is no doubt that most of Tashk Lake should be considered for inclusion in this project. Lake Niriz too, deserves much attention. The Dorudsan Bam project will probably have a very marked effect on the southern end of the basin, but less so at the northern end. It would seem to be important to bear in mind the possibility than an extensive area on the west of Lake Niriz could be used as lake pasture as is done in the Lake Hamun area of the Afghan-Iranian border or Titicaca area on the borders of Bolivia and Peru. A study of such possibilities should precede any further steps taken towards total destruction of the present ecological status of the Lake Niriz lake-complex.

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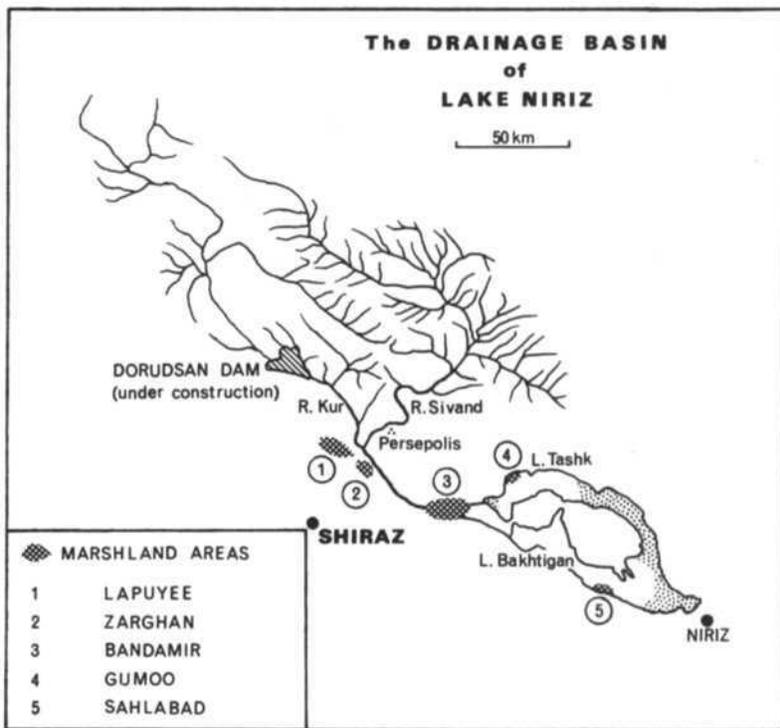


Fig.15

SOME NOTES ON THE WETLANDS OF THE NIRIZ BASIN IN S.W. IRAN

by

Lindon Cornwallis

Introduction

The province of Pars in S.W. Iran has a number of wetlands, the most important of which are situated in the Kazerun, Shiraz and Niriz basins. The condition of these wetlands in terms of water level, vegetation and salinity varies widely from year to year due to the irregular rainfall regime. They are however important wildlife habitats, the significance of which is enhanced by the arid nature of the surrounding country.

The Niriz basin has the largest areas of both freshwater marshland and of salt-lake habitats and it is these and their significance as wildlife habitats which will be examined in this paper.

THE NIRIZ BASIN

(1) Physical geography

The Niriz basin is situated on the western flanks of the Central Zagros Mountains in the Province of Fars in S.W. Iran (Lat. 30°N. and Long. 53°E. intersect in the basin, see Fig. 15) It is an enclosed drainage basin with a catchment of 26,440 square kilometers, formed where the folded ridges of the Zagros Mountains, which trend predominantly from north-west to south-east, impinge upon the buckled edge of the central plateau. The bottoms of the valleys between the mountain ridges which are mainly of limestone have been filled with alluvial deposits to form a wide flat plain surrounded by mountains.

(2) Climate

The Niriz basin lies to the east and in the rain shadow of the Zagros Mountains and receives low winter rainfall which varies widely from year to year. During the five years 1962-66 the following annual rainfall figures were recorded at Aliabad Kamin about sixty kilometers N.B. of Persepolis:- 297 mm; 168 mm; 264 mm; 408 mm; and 84 mm.

(3) Drainage

The basin is drained by the Kur and Sivand (Pulvar) rivers which rise in the high Zagros Mountains to the north and north-west, unite and flow to Lake Niriz in the south-west and lowest part of the basin. These rivers receive snow melt water from the high mountains and so maintain a flow of water throughout the year. However only in winter does any water reach the lake since in spring and summer the water is totally utilised for irrigation. The wetland habitats are associated with this river and lake system (see Fig. 15).

(4) Land Use and Settlement

Where irrigation water is available, the basin is under cultivation, the main crops being wheat, barley, cotton, sugar beet and fruit grown

in walled gardens. The main area of cultivation is the broad valley of Persepolis. This extends north along the Kur and Sivand Rivers and S.S. towards Lake Niriz. The immediate vicinity of Lake Niriz itself is little utilised for arable farming except in the S.W. in the region of Karameh and in the S.E. in the Niriz area.

The remainder of the land is heavily grazed semi-desert with a sparse vegetation of drought resistant anti-pastoral plants and in one area to the north of Lake Tashk there are quite extensive areas of relict Platacia - Amygdalus steppe forest.

The whole basin is used as grazing grounds by nomadic tribes, while the settled population lives in nucleated villages associated with the agricultural areas.

(5) The Wetlands

These wetlands are fairly remote from Shiraz and too little time has been devoted to this area to give a comprehensive report. What follows is the product of irregular observations made during the last three years. However a six-week survey of the wetlands of Fars connected with a wildfowl ringing programme is projected for November and December 1967. This work will be a joint effort carried out by a team from the Iranian Fish and Game Department and the Biology Department of Pahlavi University.

A further difficulty in preparing accurate notes has been the lack of any books or local knowledge on the identification of the flora.

The most important wetlands are associated either with the river system or with the salt lake. These are marked on Map and will be discussed in turn.

(a) The Lapuyee Marshes (No. 1 on Fig.15)

This marshland is situated in the lowest parts of a long wide valley which extends for 50 kilometers N.W. of the confluence of the Kur and Sivand rivers. The estimated maximum area of wetland is 150 square kilometers.

The condition of the marsh varies considerably. After the heavy rains of the 1964/1965 winter the water level was very high, presenting large areas of open water. In the following spring the marsh was a vast area of green sedges, reeds and rushes, where numbers of Herons and Bitterns (Ardeidae), White Stork (Ciconia ciconia) and Waders (Charadriidae, Scolopacidae and Recurvirostridae) were among the commonest birds recorded.

By January 1967 the area was almost dry and presented a large area of dry and dead marsh vegetation. No waterfowl were recorded.

The surrounding higher parts of the valley are farmed and it is probable that agriculture will encroach on this marsh. Indeed as part of the Dorudsan Dam project (see below) a drainage canal is planned to run through the centre of the area.

(b) The Zarghan Marshes (No. 2 on Fig.15)

This is a small area of approximately four square kilometers which is similar to and in fact an extension of the Lapuyee marshes mentioned above.

Like the Lapuyee marshes it received a lot of water in the winter of 1964/65, which produced a flush of vegetation in the following spring when White Pelican (Pelicanus onocrotalus), Dalmatian Pelican (Pelicanus crispus), six species of Heron (Ardeidae), Glossy Ibis (Plegadis falcinellus), Marbled Duck (Anas angustirostris), Ferruginous duck (Aythya nyroca), White-tailed Plover (Ghettusia leucura), Black-winged Stilt (Himantopus himantopus), and Moustached Warbler (Luscinola melanopogon) were among the species present. A small colony of Spoonbills (Platalea leucorodia) with thirty-two nests was also found in the marsh.

By December 1966 this marsh was almost dry and in the spring of 1967 quite large areas were cultivated. It seems likely that this area will be reclaimed for agriculture during the fairly near future.

(c) Bandamir Marshes (No. 3. on Fig. 15)

This is a low-lying area of shallow marshland of perhaps a hundred square kilometers formed at the lower end of the Kur river from which it gets its water during the winter. In the winter of 1965 the marsh was well watered and presented extensive areas of reeds, rushes and sedges as well as large areas of open shallow water where the surrounding semi-desert had been inundated. It was estimated that at this time at least 5,000 waterfowl were present in the small part of the area which was covered. The predominant species were Mallard (Anas platyrhynchos) and Teal (Anas crecca), while Gadwall (Anas strepera), Wigeon (Anas penelope), Shoveler (Spatula clypeata), Ruddy Shelduck (Casarca ferruginea), Grey Lag Goose (Anser anser) and Lesser White-fronted Goose (Anser erythropus) were present in smaller numbers. Considerable numbers of waders were also present.

In the winter of 1966 the area was much drier than in the previous year and bird numbers were reduced. 3,000 waterfowl were recorded in the same area where 5,000 had been seen in the winter of 1965.

At the present time a dam is being built at Dorudsan (see fig. 15) to conserve the waters of the Kur River, which it is planned to totally utilise for irrigation. Since the Bandamir marshes rely on winter water from the Kur River their life is limited.

(d) Lake Niriz

This is a salt lake which is divided into two parts, Lake Tashk in the north and Lake Bahktighan in the south, which are only joined when the water level is high. The area of water varies very much from year to year and Gray (in Löffler 1958) reports that the lake completely dried up in 1933/34. The lake is large being 72 kilometers long and having a maximum area of 1,810 square kilometers. It nowhere reaches any great depth and Löffler (1958) gives the maximum depth as 110 cm. and the average depth as 50 cm.

The lake received its water from run-off during the meagre winter rains, the Kur river and from the Sahlabad and Gumoo springs.

The shore of the lake supports salt marsh communities of Tamarix, Sueda, Cressa, Salicornia, etc., and at the points where freshwater enters the lake there are marshes with beds of reeds, rushes and sedges. These marshes and the lake itself form the important wetland habitats and will be dealt with in turn.

(i) Gumoo (Sangare) Marshes (Fig. 15, No. 4.)

In the N.W. corner of Lake Tashk are several springs collectively known as Ab-e-Gumoo. Their waters unite to form the Gumoo river which carries a rather remarkable quantity of slightly brackish water (2.5 cubic metres per second) out into the salt lake. Around the springs and at the mouth of the Gumoo river a marsh has developed with quite extensive areas of reeds, rushes and sedges with scattered Tamarix bushes along the edges. The river itself is fringed by tall reeds and Tamarix bushes. It is estimated that the total area of marsh is about eight square kilometers. Beyond the marsh the water from the river spreads out into the salt lake. This area therefore has a wide range of habitats all adjacent to one another which makes this a very rich area faunistically.

These marshes form an important habitat for wintering wildfowl and waders, the numbers of the former reaching 5,000, which is a conservative estimate. The wildfowl roost out in the open salt lake, the marshes and pools being used as a feeding ground. In winter, too, Marsh Harrier (Circus aeruginosus), Shaheen (Falco pelegrinoides) and White-tailed Eagle (Haliaeetus albicilla) are regular predators on the marsh.

In spring and autumn the marsh is used as a stopping place for migrant birds especially ducks (Anatidae) and waders (Charadriidae, Scolopacidae and Phalaropodidae). In April 1967, 500 Red-necked Phalaropes (Phalaropus lobatus) were recorded.

The marsh area is the breeding ground of a number of species including Black-winged Stilt (Himantopus himantopus), White-tailed Plover (Chettusia leucura), Kentish Plover (Charadrius alexandrinus) and in 1965 the first nests of the Great Crested Grebe (Podiceps cristatus) for southern Iran were found here. Ruddy Shelduck (Casarca ferruginea) almost certainly breeds in the mountains surrounding the lake and Marbled Teal (Anas angustirostris) probably breeds here.

In June 1965 a colony of White Pelicans (Pelicanus onocrotalus) with seventy nests was found on a small island out in the salt lake about four miles S.W. of the marshes. This was the first breeding record for this species from southern Iran.

The Greater Flamingo (Phoenicopterus ruber) is regular on the salt lake adjacent to the Gumoo marshes throughout the year and numbers of up to 20,000 have been estimated. No conclusive records of breeding have been obtained but villagers report that they collect and sell the eggs, and immature birds were present in October 1965 and August 1967. It is therefore very probable that the Flamingo does breed on the lake.

Since this is one of the richest wetlands in the Niriz basin and since it receives its water from a source which is unlikely to be developed for agriculture, which makes it a potentially very good area for conservation, a full list of the birds recorded here is given in Table

(ii) Sahlabad Marshes (Fig. 15, No. 5)

The Sahlabad marshes on the S.E. coast of Lake Banktigan are very similar to the Gumoo marshes. They are fed by brackish water springs and consist of about five square kilometres of brackish marsh, with rushes, low salt-marsh plants and scattered Tamarix bushes. As at Gumoo, large numbers of wintering wildfowl (approximately 1,000 in December 1966) roost in the Lake adjacent to the marsh, which many of them use as a feeding ground.

(iii) The Salt Lake

The Salt Lake itself is important as the habitat of the Greater Flamingo (Phoenicopterus ruber) and in the areas adjacent to the marshes as a roosting and resting ground for waterfowl and waders.

THE FUTURE OF THE WETLANDS OF THE NIRIZ BASIN AND POSSIBLE CONSERVATION MEASURES

The Dorudsan Dam project which aims to conserve and totally utilise the waters of the Kur River for irrigation and for the development of the agriculture of the central parts of the Niriz Basin will probably cause the destruction as wetland habitats of the Lapuyee, Zarghan and Bandamir marshes, and Lake Niriz will be deprived of a source of water.

The Sahlabad and Gumoo marshes, however, with their independent water supplies will be unaffected by the dam project, and therefore present the best areas for conservation measures. Of these two localities the Gumoo area is the most suitable for a protected region. The wetland habitats here are the richest in the Niriz basin and the water supply is more reliable and greater in quantity than at Sahlabad. The surrounding area as well as being of outstanding scenic beauty is also very important scientifically. Four kilometers to the north of the marshes there is one of the only areas of relict Pistacia-Amygdalua steppe forest left in the Province of Fars and if some measures for its protection are not made it is likely to be very rapidly destroyed. The limestone hills in the area are also very interesting and support a fauna which includes :- Wild Goat (Capra hircus) Wild Sheep (Ovis orientalis), Leopard (Panthera pardus), Jungle Cat (Felis chaus), Brown Bear (Ursus arctos), Striped Hyaena (Hyaena hyaena), and Eagle Owl (Bubo bubo). The Gumoo area therefore is of outstanding scientific interest and presents an excellent centre for the designation of a conservation area. This would be practically possible since there is only the small village of Sangar in the area under consideration,

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TABLE 4 . A SUMMARY OF THE BIRDS RECORDED AT THE GUMMO MARSHES

	1965			1966			1967			
	12/5	11-12/6	22/10	13/12	27/1	10/2	14/4	3/7	9-18/8	23/8-1/9
<i>Pelecanus onocrotalus</i>	200	300				22				
<i>Ardea cinerea</i>	2			5	9	14	2	2	6	11
<i>Egretta garzetta</i>	52			8			2		17	8
<i>Ixobrychus minutus</i>	20	2					1	10	1	
<i>Platalea leucorodia</i>	200	22				60	6	27	27	
<i>Phoenicopterus ruber</i>	500	1000	5000	20000	2000			1000	10000	7000
Wildfowl (total)	16	14	5000	3000	2000	329	158	137	283	1960
<i>Anas platyrhynchos</i>	10			520	2000	69	9	70	202	100
<i>Anas crecca</i>				1500	15	135	65		10	30
<i>Anas querquedula</i>							20		35	500
<i>Tadorna tadorna</i>		1	50		27	110	24	4-6	3	4
<i>Tadorna ferruginea</i>	1	14	200	100		7	39	21	61	279
<i>Grus grus</i>			200	150	4					
<i>Charadrius dubius</i>							21	4	20	30
<i>Chettusia leucura</i>	5	10		18		13	19	14	10	25

	1965				1966				1967			
	12/5	11-12/6	22/10	13/12	27/1	10/2	14/4	3/7	9-18/8	23/8-1/9		
<i>Charadrius alexandrinus</i>		20		6			8	26	240	315		
<i>Capella gallinago</i>				7	1		6		8	150		
<i>Limosa limosa</i>				10		1	9		70	160		
<i>Tringa ochropus</i>							2		6	40		
<i>Tringa glareola</i>									16	100		
<i>Tringa totanus</i>	2			26	1	25	8	174	162	750		
<i>Calidris minuta</i>				2	20	3			400	500		
<i>Calidris alpina</i>				30	40	62	3		1	8		
<i>Recurvirostra avosetta</i>	2	34		5	50			127	350	1000		
<i>Himantopus himantopus</i>		21		11	10	270		196	165	350		
<i>Phalaropus sp.</i>									100	500		
<i>Phalaropus lobatus</i>		10					500		1	300		
<i>Apus apus</i>									168	25		
<i>Apus melba</i>									100	100		

Agenda Item 2 : the wetland situation in the
region, other than in Turkey.

DISCUSSION

The Chairman decided that discussion of the specific problems involved in extending the MAR Project to the Region under review, could be more suitably deferred until later in the Meeting, but a number of points were raised, either in clarification of the papers presented or of a general nature, which may be summarised as follows:-

A. THE WETLAND INVENTORY

The five papers presented in this section, and only made possible by the great assistance given by correspondents in each of the countries concerned, probably give at least a 50% coverage of existing wetland areas, but indicate clearly the urgency of detailed investigation and classification of habitats and inventory of their waterfowl species and numbers (Savage).

Although any addition information from whatever source is always welcomed by IWRB as an international clearing-house, it is always preferable that it should first be collected, co-ordinated and assessed at a national or local level (Hoffmann).

B. RESEARCH OBJECTIVES

The great need is for comparative studies based on a strictly comparable standardised form or pattern. These would certainly be facilitated by the establishment of wetland research stations, for which in the rather arid zone under discussion Turkey and Jordan could certainly provide some of the most suitable sites.

There are innumerable problems on which more information is essential, such as the place of crustacean eggs in the productivity cycle and the potentialities of fairy shrimps Artemia as a source of protein, but one of the most important objectives, for which no reliable facts and figures are available, is the proper assessment of wetlands for use as pasture and the comparison between lacustrine and other pastures. The use of wetlands for grazing purposes in arid zones should be regarded as more important than their use for the maintenance of wildfowl stocks (Löffler).

In fact, experience in the Neusiedler See area of Austria has shown that conditions have deteriorated for wildfowl where grazing has been stopped, because domestic animals play a useful part in manuring lake-side areas and keeping them open and free from excessive emergent vegetation (Hoffmann). In West Pakistan many wetlands would be useless for wildfowl if they were not grazed by cattle (Savage).

In Turkey, the potential climax vegetation in 70% of the country is forest, but all but 10% has been degraded and occupied by steppe vegetation (which is not a climax), especially in the last 30 years. Of the natural areas wetlands are therefore perhaps the least altered, sharing the characteristics and values associated everywhere with this habitat. Conservation of such areas by the MAR Project would certainly be beneficial, but in all developing countries the problem is to educate the public to understand this (Hikmet Birand).

THIRD TECHNICAL SESSION

Wednesday 11 October 1967 : Ankara.

Agenda Item 3 : Wildfowl breeding areas in the Region and those outside its borders from which migrant and wintering stocks are derived, with special reference to productivity.

In the Chair: Dr. J.B. Cragg.

Five Papers were contributed as a basis for discussion of this item of the Agenda. The order in which they are reproduced in this Report seems the most logical, taking account of the fact that a very high proportion of the total numbers of wildfowl occurring annually in the Region must have originated from breeding areas in the U.S.S.R. The two major contributions presented by Prof. Yu. A. Isakov therefore come first: they review the dispersal or migration pattern of individual species and wildfowl populations breeding in the central Palaearctic, mainly eastern European Russia and western Siberia, and, in the second Paper, analyse the status and numerical strength of those which tend partly or wholly to winter in south-west Asia and Africa.

The next Paper, by Mr. C.D.W. Savage, looks briefly at one of the main Siberian breeding populations from the point of view of its importance to West Pakistan. A Paper by Prof. Dr. C. Kosswig examines another aspect of the reverse side of the picture, namely the dispersal pattern of birds from a particular breeding colony, chiefly of Ardeidae, in south-west Asia itself, as reflected by the results of a pioneer bird-ringing project at the Lake Manyas sanctuary in Turkey.

finally, a further contribution by Mr. Savage describes studies carried out by him at Lake Rezaiyeh in Iran, which throw light on two interesting examples of secondary productivity cycles and their relevance to the breeding of certain waterfowl species.

As in previous sections of this Report a summary of the points raised in discussion is given at the end of the group of Papers.

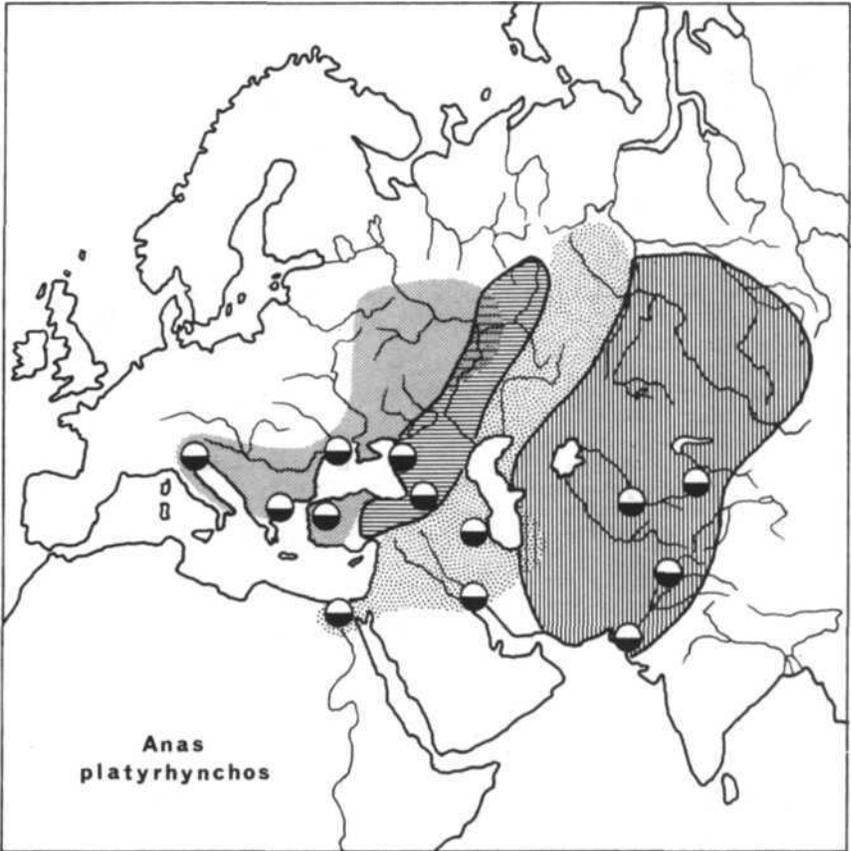


Fig.16. The range of various geographical populations of the Mallard according to ringing data.



The limits of the individual populations.



The main wintering grounds of the birds belonging to these populations.

INTERRELATIONSHIP OF WATERFOWL BREEDING AND
WINTERING AREAS IN THE CENTRAL PALEARCTIC

- by -

Yu. A. Isakov and T.P. Shevareva

To solve many of the practical tasks of conservation and wise use of waterfowl resources, it is necessary to discover the links existing between their most important breeding and wintering areas. The first very general study of the over-all distribution of major geographical populations of waterfowl breeding in the U.S.S.R. was prepared by us in 1965 and reported at the VII International Congress of Game Biologists held in Belgrade (Isakov, 1965, 1967). Once again it drew the attention of scientists and game administrators to the need for closely co-ordinating their respective research and management programmes. The study also testified to the fact that the successful implementation of Project MAR, for instance, depends above all on obtaining good co-operation from countries of south-west Asia and Africa.

The study mentioned above can only be regarded as preliminary, because the amount of objective data, based on ringing returns, about the movements of individual populations is still quite insufficient. In recent years our information on the subject has nevertheless been extended. It owes much to the development of bird ringing activities started in Pakistan, India and Iran as well as in some other countries in the Near East. At the same time we have come to know a good deal more about where the principal winter concentrations of ducks and geese occur and also about the routes of their seasonal migrations.

All this makes it possible to define more exactly the limits of the areas of geographical populations of waterfowl which frequent countries of south-west Asia and Africa on migration. Taking into account the fact that the area of individual populations of different species do not necessarily coincide, it would seem appropriate to begin by presenting the data on the distribution of populations of eight selected species of ducks. This is based on the information now being accumulated by the Hinging Centre of the Zoological Institute of the U.S.S.R. Academy of Sciences.

The breeding population of mallard Anas platyrhynchos of central regions of the European part of the U.S.S.R., comprising the upper reaches of the Volga, the drainage system of the Oka and the upper Don, has its main wintering grounds in the Balkan Peninsula and also partly in western Turkey, along the shores of the Marmara and Mediterranean Seas and their hinterland (from Istanbul south to Denizli). The mallard population inhabiting the western flank of the Urals, i.e. the drainage system of the Kama, the Vjatka and the Middle Volga, winters on the Azov and Black Seas, particularly along the Caucasus coast including north-east Turkey.

The mallards breeding along the eastern flank of the Urals, in the South Transural regions and West Kazakhstan, have their chief moulting

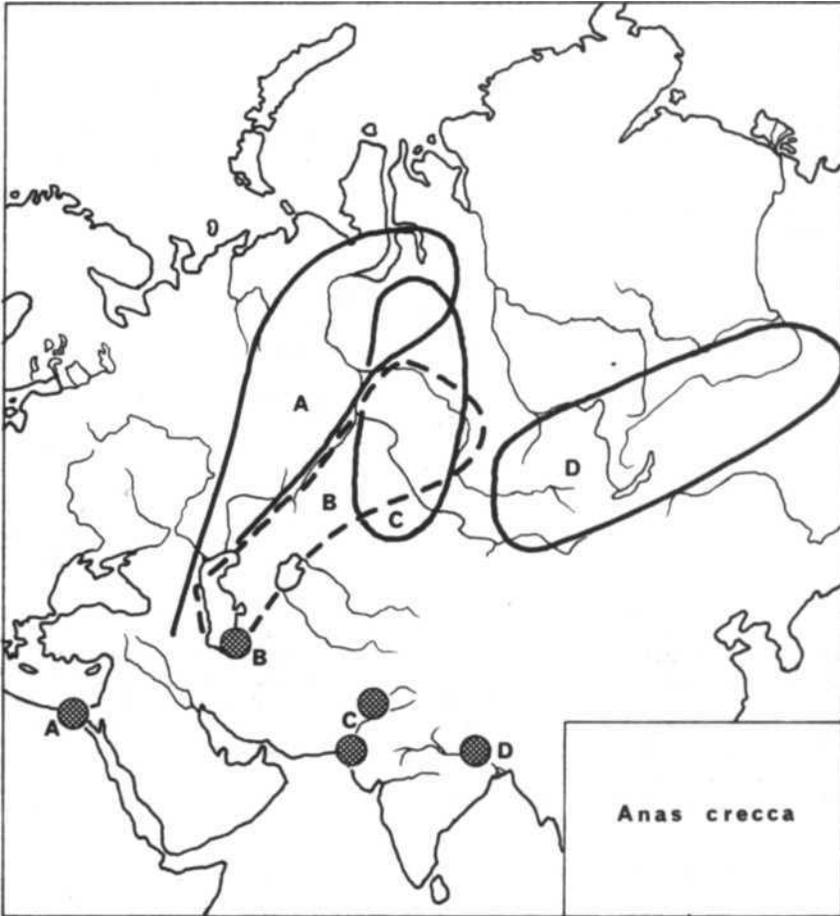


Fig.17 . The range of various geographical populations of the Teal according to the ringing data.



The limits of the breeding areas of individual populations.



The main wintering grounds of the birds belonging to these populations.

grounds in the Volga delta and then fly to wintering grounds in countries of the eastern mediterranean, reaching the Nile delta in the south. Another section of this population winters in the region of the Caspian Sea and also in Iran and Iraq. Mallards of the southern part of West Siberia and the Kazakhstan steppe have their wintering grounds in the south of the U.S.S.R., including the Central Asian republics from the Caspian to south-eastern Kazakhstan, and also in West Pakistan and northern India. Finally, the east Siberian population most probably migrates to South-East Asia.

The seasonal distribution of the geographical populations of teal Anas crecca has much in common with that of the mallard. Birds breeding to the west and east of the Urals from the Pechora and the Kama east to the lower reaches of the Ob have their wintering grounds near the western shores of the Caspian and southwards as far as the Nile delta. The population inhabiting the territory between the middle course of the Ob and that of the Irtish winters around the south-eastern shores of the Caspian, in Iran and probably in Iraq.

Teal breeding in the area of western Siberia situated east of the Ishim and west of the Yenisei, winter in Central Asia and in the drainage system of the Indus (West Pakistan and northern India). The breeding population of central and eastern Siberia, from the upper Yenisei to the middle Lena, has wintering grounds in eastern India, within the drainage system of the Ganges.

Pintail Anas acuta whether from the west of the Urals (the Pechora, Kama and Vjatka) or from the eastern flank of these mountains (e.g. along the western tributaries of the lower Ob, and of the Irtish and Tobol) all have their moulting grounds within the Volga delta. When they finally depart on migration they fly in three directions; (a) straight to the west across southern Ukraine to the Balkan Peninsula and Italy, in some cases reaching Tunisia and even Spain; (b) south-west across Stavropol Territory and Georgia to Turkey and other countries of the eastern Mediterranean as far as the Nile delta; (c) straight south along the western shore of the Caspian Sea to Azerbaijan and Iran sometimes reaching the northern part of the Persian Gulf within the borders of Iraq.

On the other hand the breeding populations extending from the general area of the confluences of the Ob, Irtish and Tobol, north-eastwards to the drainage system of the Taz, mostly move to moulting areas situated on the lakes of northern Kazakhstan. Some of these birds spend the winter near the south-east shores of the Caspian Sea (in the Turkmen S.S.R. and in Iran), others on the wetlands of Central Asia, but the majority fly somewhat further south to the drainage system of the Indus and the upper reaches of the Ganges, in other words to West Pakistan and northern India. Pintail breeding in the south-east of west Siberia winter in eastern India, East Pakistan and probably still further eastwards.

As for the wigeon Anas penelope, wintering in Asia is typical of the population breeding in the area lying between the middle reaches of the Ob and Yenisei and extending to the eastern tributaries of the latter. These birds have moulted within the Volga delta as well as on the lakes of western Siberia and northern Kazakhstan. In general wintering grounds



Fig.18. The ranges of various geographical populations of the Pintail according to the ringing data.



The limits of the breeding areas of individual populations.



The principle fall migration routes of the birds belonging to different populations.



The areas of summer moulting (ringing stations).



The main wintering grounds.

of the wigeon are related to the places chosen by them for moulting. For example, 70% of the birds moulting in the Astrakhan Reserve migrate to western Europe, but only 42% of those moulting on the lakes of Kazakhstan. The rest are mainly distributed in winter between the Black and Caspian Seas and from there onwards to the eastern shores of the Mediterranean, some reaching Africa and spreading through the whole area between Ethiopia and Tunisia. However, another part of the population winters near the eastern shore of the Caspian, in drainage basins of Uzbekistan and Kazakhstan, moving on to West Pakistan when severe cold sets in. Finally, the winter quarters of wigeon belonging to the east Siberian population are in eastern India and East Pakistan in the valley of the Ganges.

The majority of shoveler Anas clypeata inhabiting European territory of the U.S.S.R. winter in West European countries; birds migrating to the Balkans and Italy sometimes reach Tunisia. The populations breeding in the South Ural area (Orenburg district), as well as many other shoveler which moult in the Volga delta, migrate in large numbers through Georgia to Turkey and other countries of the eastern Mediterranean, as far south as lower Egypt. A proportion of the birds, however, when they leave the Volga delta, fly straight south over Azerbaijan to Iran and to Iraq and the wetlands of the Euphrates.

The shoveler population of the middle Ob and Irtish drainage system has its moulting grounds on the lakes of (West Siberia and northern Kazakhstan. Thence they fly to the east shore of the Caspian (Turkmenistan), the Persian Gulf (Iraq) and Indus basin (West Pakistan). Wintering shoveler in the valley of the Ganges (India) belong to yet another geographical population, flying in spring via the upper course of the Amur to nest in the area of the middle Lena.

The migration routes of the garganey Anas querquedula are more complex than those of the other species. The eastern limit of the European population is to the east of the Urals, approximately along the lower reaches of the Irtish and Tobol. Birds relating to this population moult in the Kuban delta (where the young of the year also complete their fledging), as well as in the Volga delta. The greater part of the moulted birds depart to the west through the Ukraine to the Balkans, Italy and the south of France. Birds belonging to this population, however, rather rarely winter in the north-west of India, but in addition one of their main migration routes from the Volga delta passes through Georgia to the Arabian peninsula and on to East Africa. Some of the latter may occasionally stay to winter in Turkey and in Israel, but the major wintering quarters of this species are certainly in Africa. We have had a few recoveries of ringed birds reported from Nigeria (Kano) and from Lake Tanganyika (Tanzania).

The other or (West Siberian breeding population of the garganey, inhabiting the area between the Tobol and the Ob, on the lakes of the Novosibirsk district and northern Kazakhstan. They go on to spend the winter in northern India (Uttar Pradesh, Bihar) and East Pakistan (the area of the Ganges drainage system).

In the U.S.S.R. one can clearly distinguish two sizeable geographical populations of tufted ducks Aythya fuligula - the European and

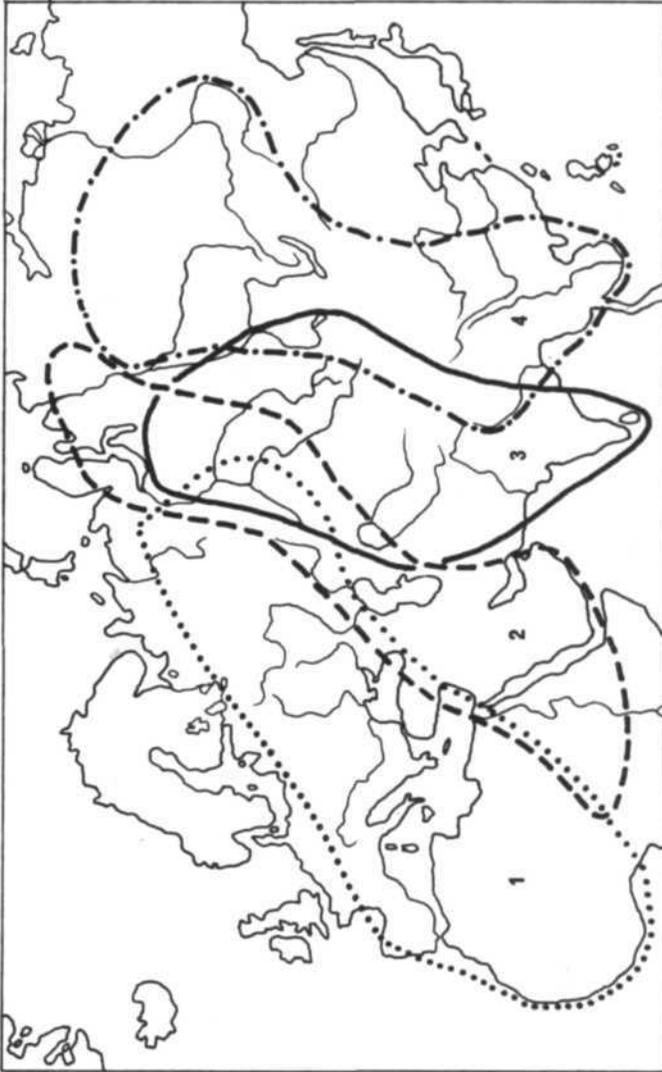


Fig.19. The range of some of the main geographical populations of waterfowl in Europe, Africa and Asia.

- 1 : European - Black Sea/Mediterranean.
- 2 : West Siberian - Caspian/Nile.
- 3 : Siberian/Kazakhstan - Pakistan/Indian.
- 4 : East Siberian - Thibet/Ganges .

the West Siberian. However the limits of their respective areas do not coincide with the geographical boundary between Europe and Asia, but lie along the valley of the Lower Ob. The European population winters only in countries of western Europe, while some West Siberian birds move westwards to the Balkans and others south-westwards to the shores of the Caspian. Some pass on to winter along the eastern shores of the Mediterranean and as far south as Lower Egypt, but those breeding in the south-east part of West Siberia (the Kemerovo region and Altai Territory) in most cases fly to wintering grounds east of the Caspian Sea (in Turkmenistan in particular) and probably in adjacent regions of Iran.

Hinging has also made it possible to identify two similar geographical populations of the common pochard Aythya ferina, European and West Siberian. There is no point of contact, either between the migration routes or wintering grounds of these two populations, although the limits of their breeding territories are rather like those of the Tufted Duck, in this case being situated along the Irtysh. The main wintering grounds of West Siberian pochards have been found to be along both the western and eastern shores of the Caspian.

The geographical populations

The conclusions which may be drawn from the information on the eight species reviewed above make it possible to prepare a map, Fig. 19, of the major geographical populations of waterfowl frequenting Africa and south-west and southern Asia in winter. The breeding population of many European countries, an extensive part of European U.S.S.R. and the Transural regions of the extreme west of Siberia has its winter quarters on the Black and Azov Seas and also in Mediterranean countries, including North Africa and western Turkey. This population may be called the "European - Black Sea - Mediterranean" (we formerly named it the "European-West Siberian-Black Sea-Mediterranean", but the additional information now available justifies the more simple title). The boundaries of its area do not so far need any substantial revision in the light of the new information.

The population of duck and geese breeding along the west of the Urals (within the Pechora, the Kama and the Vjatka drainage systems), and in the north and west of West Siberia, along the Lower Ob, the North Sosva, the Tavda, the Iset and the Tobol, and also to some extent in the north part of the Barabi Steppe, winters near the shores of the Caspian, in western Turkey, in the countries of eastern Mediterranean, including the Euphrates valley and the Nile delta, around the Persian Gulf, in Ethiopia and in the Sudan. This winter range is characteristic of the mallard, teal, pintail, and shoveler of this population but applies to a lesser extent to the garganey, which migrate to wintering grounds somewhat further south. The only other species which constitute something of an exception is the wigeon. Those wintering in the areas mentioned above originate from a more easterly population, breeding in the area between the Ob and the Yenisei.

In the light of more recent information, it is necessary to modify our previous concept of the geographical boundaries of this "West Siberian - Caspian - Nile", population, as we have named it, by moving those of the breeding area rather to the west and similarly moving the

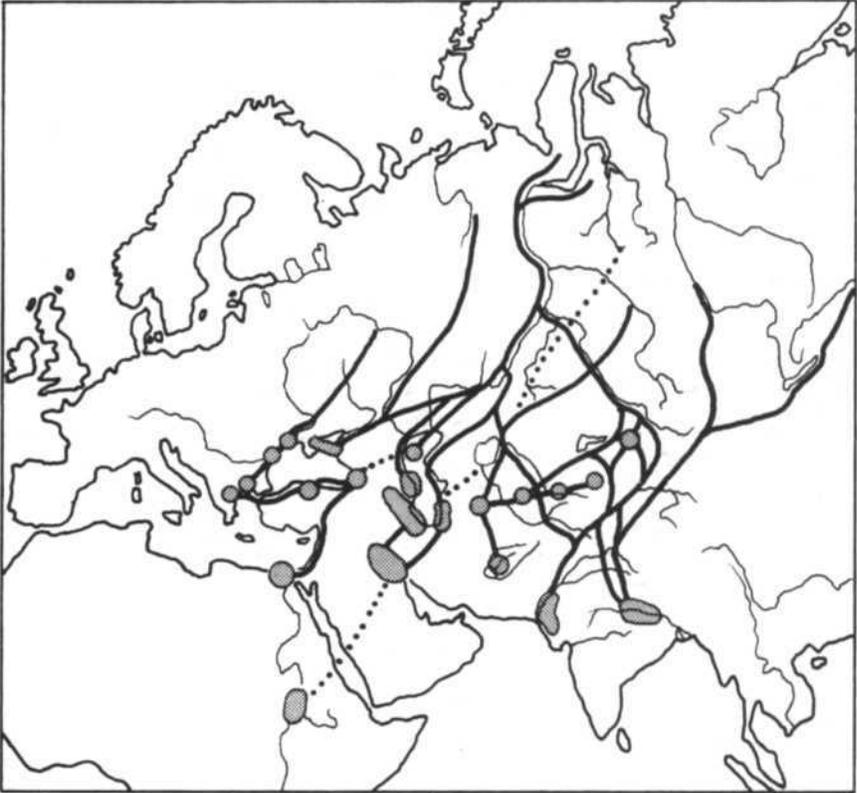


Fig. 20. The main waterfowl migration routes in the central Palearctic.



The main routes of the seasonal migrations.



Probable migration routes.



The main wintering grounds.

western limit of the winter range, in the region of Africa south of the Sahara. Although in the north the winter range is a little narrower than we showed it previously, it widens very substantially towards the south.

Mallard, shoveler, pintail, teal and wigeon breeding in the central and south-east parts of West Siberia and in Kazakhstan winter near the south-east shore of the Caspian Sea, in the south of Central Asia and within the Indus drainage system. Wintering grounds in western India are also used by garganey, not only those which have bred in West Siberia but also sometimes by those from European U.S.S.R.; in short the autumn migrations of the species are south-easterly as well as south-westerly. New information has shown that the area inhabited by this geographical population, the "Siberian-Kazakhstan-Pakistan-Indian", stretches during the breeding season somewhat farther to the east than was earlier believed, namely as far as the upper reaches of the Yenisei. At the same time it has been discovered that the wintering grounds do not extend throughout the whole of India but only to western and central sectors.

The ducks which breed in Central and East Siberia for the most part winter within the Ganges drainage system. Thus pintail, shoveler, wigeon and teal from the Yenisei and the Lena all move to that area and only the garganey of the species wintering there come from West Siberia. This geographical population can now probably be defined as a self-contained "East Siberian - Tibet - Ganges" one, distinct from the Amur-Chinese population. We have previously grouped the two together for lack of any information to the contrary.

Conclusion

Topographical features govern the distribution of each of the geographical populations defined in the previous paragraphs. The boundaries largely depend on where the birds concentrate for their summer moult and the situation and ecological characteristics of major flight-lines. For example, wildfowl migrating to the coasts of the Black, Azov and Mediterranean Seas tend to fly down the valleys of the Dnieper, Don, Volga and Ural.

The principal migration route of the "West Siberian - Caspian - Nile" population is believed to pass along the valleys of the Lower Ob, the Irtish and Tobol and so over the southern end of the Urals to the Emba and the Volga delta. From this intermediate terminal point a number of flyways radiate, one lot of birds, especially wigeon and pintail, moving west towards the Balkans and on to the Mediterranean, while the majority pass along the west shore of Caspian to Azerbaijan and Iran. A considerable proportion of the latter continue their flight southwards to the valley of the Euphrates and the Persian Gulf and it is probably from these areas that many reach the Upper Nile drainage system, Ethiopia and the Sudan, where very large numbers winter, but their flight routes have not yet been precisely determined. However, according to Dr. S. Mathiasson's observations (personal communication) they do not arrive in the Sudan via the Nile Valley but from the Red Sea.

From the Sudan migrant duck spread far to the west, dispersing to

the numerous temporary rain ponds which form there during the period of the northern winter. However, as previously indicated by no means all the duck migrating from the Volga delta in autumn move to the south. A considerable number go south-westwards across the Caucasus and appear near the south-east shore of the Black Sea, although their exact route over the mountain barrier is not yet known. Some of these birds pass on towards the eastern shores of the Mediterranean and along them to the Nile delta.

Ducks and geese of the "Siberian - Kazakhstan Pakistan - Indian" population assemble in great flocks after breeding and migrate to moulting grounds situated in the lake districts of south-west Siberia and Kazakhstan. From there the greater part move south first along the Aral-Turgay route and then along the Syr-Darya. However, a significant stream of birds also starts off along the Irtish, and, after crossing the mountains through the Dzhungar gateway and the Ili, Aksu and other river valleys, reach the Tarim drainage system. From there they fly through the mountain passes between the Hindukush and Karakoram to the upper reaches of the Indus and its tributaries. But a great number of them remain behind to winter in the wetlands of Central Asia.

Present indications are that the duck which arrive to winter in the area of the upper Ganges must get there by travelling up the Irtish, Yenisei and Selenga, and flying over the Himalayas to the east of the Karakoram. Good evidence of this migration route is provided by the high concentration of birds at certain seasons on the Lop Nor in Sinkiang. However this is very certainly not the only route followed by the birds of the "East Siberian - Tibet - Ganges" geographical population.

Further detailed investigation of the seasonal distribution of the geographical populations of the birds dealt with in this paper should make it possible to define more accurately not only their respective limits but also the habitat requirements for successful breeding, summer moulting and wintering. These data can then be used as a scientific basis for planning international measures for waterfowl conservation and the utilization of wildfowl resources.

THE STATUS OF WATERFOWL POPULATIONS

BREEDING IN THE USSR AND WINTERING IN S.W. ASIA AND AFRICA

by

Prof. Y.A. Isakov

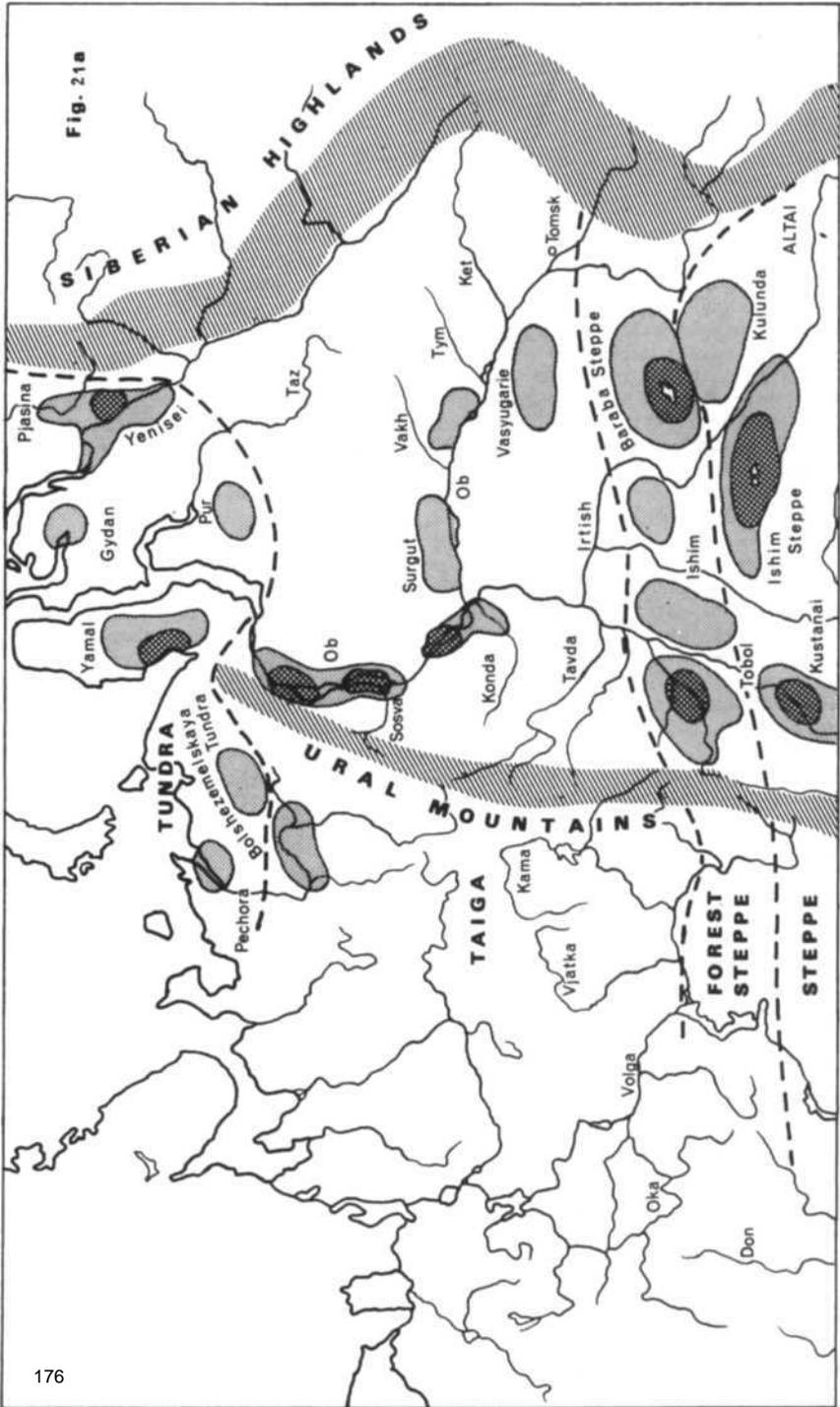
In my other special report for this Meeting, prepared in collaboration with Miss T.P. Shevareva, the geographical distribution of the main waterfowl populations breeding in the USSR and wintering in south-west Asia and Africa has been reviewed. If this is plotted on a physical map it will be seen that its limits are formed by natural features, namely mountainous regions where waterfowl are scarce. Thus to the east the boundary is the Central Siberian Highland, to the south-east the Western Sayan and Altai mountains, to the south the Tian Shan, Alai, Pamirs and Hindu Kush and the high ridges connecting them with the Elburz and Caucasus. In all these montane peripheral areas waterfowl are only to be found breeding or wintering on large lakes, such as the Issyk Kul and Baikal, or in broad low-lying valleys of large rivers, such as the central Yakutian lowland.

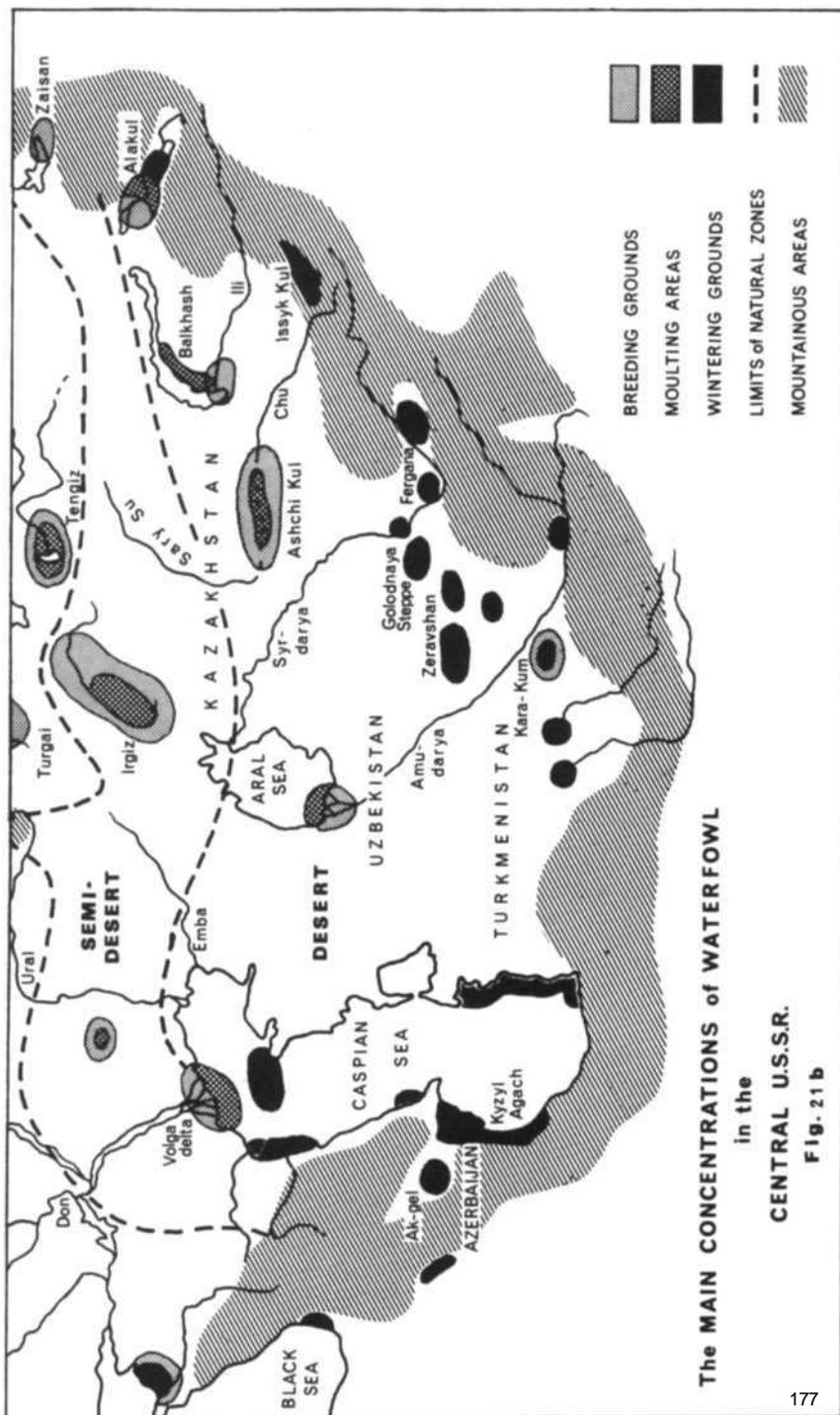
A further important point is that the territory of each of the specific waterfowl populations is by no means completely or uniformly occupied by the birds. It is quite easy to pick out the particular areas which tend to have the highest productivity of wildfowl species, these areas sometimes being separated by vast stretches of country with a relatively small population. Consequently, for the purpose of estimating the numerical strength of any of the geographically distinguishable wildfowl populations, it is these smaller areas of high concentration which are important. They are the first places which need to be studied when carrying out census work and are also best suited for the assessment of comparative breeding success from one year to another. In each of them it is very necessary that adequate reserves and wildfowl sanctuaries should be created.

We have therefore now reached the stage where, for the European/African and European/Asian waterfowl populations of the USSR, it is possible at least to give a general picture of the four principal zones in which these populations are situated and the localities within these zones where very high concentrations of birds are to be found. The results are summarised in the map (Fig. 21) and are discussed in detail below.

A. The Tundra Zone

In the tundra and forest-tundra the maximum waterfowl productivity is to be found along the lower reaches of the Pechora, in the lake district of the Bolshezemelskaya tundra, in central and western Yamal, on the lakes of the Fur drainage system, in the Gydan peninsula, along the lower Yenisei and in the Pjasina basin. The great majority of birds keep to river valleys and to those lakes which have some aquatic vegetation which, in this far northern zone, tends to be very sparse. Pintail, teal, wigeon, tufted duck, scaup, common and velvet scoter and red-breasted merganser are especially common in the valleys, where bean and white-fronted geese and red-breasted geese (the endemic West Siberian species)





also have their breeding and moulting grounds. The long-tailed duck is the only species to be found breeding on lakes in the moss-tundra watershed areas.

Most of the birds of this zone stay to moult in their breeding areas and their moulting grounds are also used by more southerly populations which fly up to them from the forest-tundra. Many species, namely the bean goose, Bewick's swan, long-tailed duck, common scoter and the majority of velvet scoter and scaup, when they finally migrate in the autumn, travel westwards, apparently following the sea coasts; this probably applies to a proportion of wigeon and pintail also, and all these birds form part of the wildfowl stocks wintering in the north of western Europe. However, large numbers of birds also leave the region by migrating up the Ob and its tributaries and so to the Caspian or further south. The red-breasted geese, in particular, with very few exceptions, remain within the geographical limits of what I have designated in my other paper as the Vest Siberian/Caspian/Nile population.

Quantitative data on the waterfowl of this zone are very scanty. According to the figures obtained in our midwinter census the total population of red-breasted geese is estimated at about 30,000. The population density of ducks, geese and swans in one of the rich wildfowl areas of the western Yamal was calculated in 1958-1960 as 270 birds per 100 ha. of water surface (Pugachuk, 1965). Most of these, belonging to the dominant species (bean goose, long-tailed duck and king eider) migrate westwards as previously mentioned, and not more than 52 birds per 100 ha. of water are southerly migrants. In 1961, in western Taymyr, on one of the Pjasina tributaries, a count of 150,000 moulting geese was made along 350 km. of river (Kretschmar, 1966), but of these we have reason to believe that the majority of bean geese winter in China and apparently only the white-fronts join the southerly migration.

Waterfowl habitats in this zone are not at present subject to any major modification, but the human population of the north is rapidly increasing as economic development takes place and particularly so in the river valleys with the expansion of the fishing industry. This is bound to have an unfavourable effect on the breeding and moulting grounds of wildfowl, especially geese, so that plans are now under consideration for establishing a network of game reserves and sanctuaries in the tundra and forest-tundra.

B. The Forest or Taiga Zone

The most important waterfowl habitat in the taiga of the West Siberian plains is situated in the valleys of the Ob and Irtish and their great tributaries. One of the richest areas is a 400 km. stretch of the lower Ob, north of the confluence of the North Sosva. Here the river separates into several channels and the flood plain can be as much as 40 km. wide. A characteristic feature of this flood plain are the large lakes, called "sors", where tributaries enter the main river, which fill up with the spring floods and last until the end of the summer. Some of these "sors" can attain an enormous size - e.g. the Shuryshkarsky Sors 20,300 ha. and the Voikarsky Sor. 7,200 ha. -, although their average depth is only between one and three metres.

Because of this, their water quickly warms up and becomes overgrown with aquatic vegetation, resulting in high concentrations of breeding duck. The predominant species is pintail, accounting for 30% of the duck population; tufted duck make up another 20% and wigeon and teal are plentiful. However, the total number of breeding duck can vary by as much as eight or ten-fold between different years; it is much lower after a prolonged cold spell in the spring or high continuous flood (Danilov, 1965). During the summer moult duck congregate in the "sors" by the thousand and scores of thousand.

Other areas of the taiga zone which are rich in wildfowl also occur in the lower or middle reaches of the Ob basin. One of these is a broad flood plain on the left bank north of the confluence of the Irtish and lower reaches of the Konda river. Again there are many "sors" and other shallow lakes, connected by a dense network of channels, and the whole area is some 250 km. long and from 10 to 40 km. wide. According to the 1963 summer census, carried out by Mrs. L.I. Sorokina, the results of which were published in 1965, there were between eleven and thirteen wildfowl per square kilometre on the average, most of them pintail, but also large numbers of teal, shoveler, and tufted duck. This would mean roughly between 1000 and 2000 birds in the flood plain for every 10 km. of river or a total of well over 100,000.

A third important area of concentration is the Surgut Polessie, a stretch of 200 km. on the right bank of the Ob between the rivers Lamin and Trom-Yugan, characterized by the forest-lakes of the drainage basin of these tributaries. Also in the Ob valley is a fourth area of remarkable importance for waterfowl, lying between the Vakh and Tym tributaries and about 150 km. in length. A survey of about half this area, comprising the Aleksandrovsk district of the Tomsk region, was carried out in 1963 (Zinoviev, 1965) and between two and three hundred whooper swans and over 100,000 ducks were recorded as breeding. Very large numbers of duck also congregate on the flood-plain lakes for the moult and it can be assumed that the autumn total for the whole area certainly reaches 200,000 birds. Finally the moorland of Vasyuganie district, between the Ob and Irtish, is plentifully supplied with lakes and can also be credited with an annual output of duck around the 100,000 mark.

In the above account only some of the more important of the wildfowl breeding areas of the West Siberian forest zone have been mentioned. There are many other areas where very considerable concentrations of waterfowl occur in the flood-plains of the Ob, Irtish, Pechora, Upper Kama and several other big rivers. For example, some 47,500 breeding duck, mainly mallard and teal, were recorded in the Tomsk region in 1963. The survey was carried out by a postal questionnaire which did not give complete coverage, but only dealt with about 19,000 ha. of the wetlands. It showed that the total annual productivity of the waterfowl of this section of the forest zone is of considerable significance, - of the order of a million birds. The annual variation in output is also quite noticeable, but not to the same extent as occurs in the more southerly zones'.

C. The Forest-steppe and Steppe Zones

Conditions for waterfowl in these zones are quite different from those in the two described above. The main breeding concentrations are

situated not in river valleys but on the vast boggy plains which are full of lakes. Most of these lakes are shallow, with gently sloping banks, so that almost their entire surface can be used by duck. This spacious lake-plain is the richest and most productive wildfowl area in the whole of the USSR.

In the forest-steppe zone four particularly good wildfowl areas can be picked out. The first is the Baraba region, between the Ob and Irtysh, which has about 2500 lakes of 1 ha. or more, in addition to the big shallow Chany Lake which covers about 330,000 ha. Characteristically, these wetlands are covered with large reed thickets or so-called "Zaimishche" lakes with sedge-fen slowly creeping in. The Baraba is highly productive for wildfowl and is an especially good breeding area for greylag geese and cranes. The second very favourable area is the Ishim forest-steppe between the Irtysh and Ishim rivers, comprising about 1600 lakes with a total area of 200,000 ha. It is somewhat similar to the Baraba, but without any large water body of the Lake Chany type. Thirdly, there is the Tobolsk or Kurgan forest-steppe, between the Ishim and Tobol rivers, where more than 1500 lakes are characterized by rich vegetation and great waterfowl resources. Finally, there is the Trans-Ural sector, which also has numerous lakes, most of them in the plain but the westernmost Khyshym-Kasli group situated in the Ural foothills.

This forest-steppe lake district forms the main breeding and moulting area of many species of duck, greylag geese and coot. Its most characteristic species is the common pochard (20-40% of the wildfowl population), the next most common being the mallard (9-20%). Rather less numerous are teal and garganey, followed by pintail, gadwall and shoveler. The number of birds varies very greatly according to the water level of the lakes. Wet and dry seasons tend to alternate, the former resulting in high productivity and the latter leading to a considerable reduction. However, the lakes never all dry up simultaneously throughout the area, so a total breeding failure can very seldom be expected.

There are no adequate data on the number of wildfowl of this zone, since no special survey has ever been made, but it certainly runs to several scores of thousands. In the last few years, the stocks of several species have greatly decreased. Greylag geese are becoming rare and the number of mallard, some other duck species and coot is reduced. This is due to two main reasons - (a) the big increase in human population and consequential shooting pressure and (b) agricultural development with ploughing up of virgin soil and reclamation of mires.

The steppe zone proper is just as rich in waterfowl as forest-steppe, but the extent of the areas with high concentrations of birds is not so large. The most important of them are the Turgai lowlands and the neighbouring Turgai plateau, the southern Ishim steppe, the Kulunda steppe and the Tengiz-Kurgaldjin lake complex. In the steppe fresh water lakes and salt lakes are equally common, as are lakes overgrown with reeds and lakes lacking any vegetation.

The Turgai areas mentioned above are situated in the Kustanai region and contain about 5000 lakes covering a total of some 490,000 ha. This is a mass breeding and moulting place and also one in which great

numbers of duck and geese congregate for their seasonal migration. The Naurzum State Reserve is situated in the area. Both the numbers and composition of wildfowl vary a great deal according to changes in water level from year to year. The most numerous breeding species are gadwall and garganey, followed by greylag goose, mallard, shoveler and common pochard, but the variety of species is also very much influenced by the type of lake. No attempt has yet been made to estimate the total breeding populations, but some indications can be given. Thus when the lake levels are high, four or five greylag nests have been found along every kilometre of the shore line. In similar conditions, such as occurred in 1966, 2000 pairs of gadwall bred in the Naurzum Reserve and, in the same year, more than 44,000 moulting duck were recorded on Lake Aksuat, while the total number on all the lakes of the Reserve amounted to 160,000. Only one tenth of this number has been recorded in a dry year.

The second area, the southern Ishim steppe, contains 2700 lakes with a surface of nearly 450,000 ha., which are also of great importance as breeding and moulting grounds of duck. The Kulunda steppe, in the Altai Territory, has 1500 lakes, but most of them are practically without emergent vegetation and of much less value for wildfowl reproduction than the others mentioned. By contrast, the Kurgaldjin-Tengiz region is one of the richest, with 3900 lakes of very varying types. In 1959, lake Kurgaldjin itself (32,000 ha.) held 14,000 pairs of waterfowl of which coots were the most numerous followed by pochard, mallard, red-crested pochard and greylag geese. In July of the same year, it was estimated that 125,000 surface-feeding duck, 7000 diving duck and 15,000 greylags were moulting in the area. The great Tengiz salt-lake (150,000 ha.) is the moulting place of large numbers of shelduck, ruddy shelduck, pochard and flamingoes, total numbers sometimes reaching 400,000 birds.

The human population density of the Siberian and Kazakhstan steppe country is rather high and is increasing annually. Water is being used in huge quantities for irrigation and the surface run-off into the lakes is falling as a result of deep ploughing. Many lakes are becoming shallow and swamp land is being reclaimed. Most lakes are heavily fished and the number of motorboats is increasing. All this is having a very adverse effect on the breeding success of waterfowl and, in order to try to stabilise wildfowl resources, a network of large and small game reserves, where birds are given full protection, is having to be created.

D. The Semi-desert and Desert Zones

In the semi-desert zone the areas in which waterfowl are abundant are not numerous nor is their size extensive. The largest is situated on the lower reaches of the Irgiz and Turgai rivers, which, together with the Ulu-Dzhilanchik, form "dry deltas" with an enormous number of river branches and lakes. This area is used for breeding and moulting by many ducks, geese and swans, some 97,000 moulting wildfowl having been recorded on a selection of eight lakes in July 1960 (Gavrín, 1961) and the total being no doubt far greater.

The second good area comprises the Kamysh-Samarsky lakes, situated between the Urals and the Volga. It contains a greylag breeding

population and is a great moulting ground for ducks. Thirdly, there is the Volga delta itself, the seaward end of which is of remarkable importance as a breeding area for greylags, mute swans and coots. The delta is also the moulting-ground for huge numbers of ducks, as many as 380,000 having been recorded on one count and the total for the whole season having certainly been much greater (Krivonosov, 1967). During the spring and autumn migrations, hundreds of thousands of waterfowl congregate around the delta mouth. Finally, the last area worth special mention is Lake Zaisan: the fact that in 1963 the number of birds bagged by wildfowlers was estimated at 74,000 is a good indication of the bird population of this area.

Agricultural development of the arid semi-desert zone is proceeding more slowly than in the steppe and forest-steppe zones and the wetlands are therefore not at present so endangered as those lying further to the north.

The true desert zones of south Kazakhstan and Central Asia are naturally still poorer in wetland areas than the semi-desert. However, some important localities may be noted, namely the Alakol lakes, Lake Balkhash including the deltas of rivers flowing into it, the lower reaches and "dry deltas" of the Chu and Sary-sa rivers, the Ashchi-Kul lakes and finally the Amu-Darya delta. The species composition of wildfowl occurring in these areas is different from that of the more northern wetlands, the most numerous species being coot, red-crested pochard and ferruginous duck.

Irrigation of the desert zone is now being carried out on a large scale, great quantities of water being diverted from the rivers for the purpose. As a result of the reduced flow, the flood-plains and deltas are tending to dry up. Thus, in the Fergana valley and on the Zeravshan flood-plain, lakes have turned into swamps, while the area of the Amu-Darya delta has been cut by half. Breeding populations of waterfowl have consequently greatly diminished and the productivity of wildfowl species in particular is now rather low. However, the water bodies of the zone still remain very important for wintering waterfowl and, in recent years, the situation has been somewhat improved by the construction of a great number of reservoirs. In fact, these reservoirs, some of which cover tens of thousands of hectares, have become the principal areas in this part of Central Asia where waterfowl concentrate in winter.

The only natural wetlands of any size, which still exists in this zone and can be used by wintering birds, are along the shores of the Caspian and Lake Issyk-Kul. On the other hand, very considerable numbers of waterfowl have begun to use the lakes formed by seepage water from the Great Kara-Kim Canal and the reservoirs built on the Zeravshan, Syr-Darya, Surkhan-Darya and other rivers. Extensive shallow waters also form in winter in Arnasai and the southern part of the Golodnaya steppe as a result of the overflow of irrigation systems built for cotton production. In short, the significance of man-made waters for waterfowl conservation, which is becoming remarkable everywhere, is particularly great in these dry desert regions. Special measures are to be taken to improve their status from the point of view of vegetation and especially animal food-plants and these ought greatly to increase the waterfowl carrying-capacity of the waters concerned.

Winter distribution of the waterfowl populations of the USSR

In this final section of my report, I propose to deal with certain problems of wintering wildfowl, with special reference to the fairly complete midwinter census carried out in the USSR in January 1967, which included the areas dealt with in the previous sections.

The census enabled us to determine the number of birds belonging to the geographical populations under study, which remain in USSR during winter, and the results are summarized in Table . The data do not, however, provide a means for estimating the total number of birds constituting these populations, since a considerable portion migrate to other countries to winter. Unfortunately, in many of these countries comparable censuses were not carried out and in many other countries counts were by no means complete.

As a result of this, it was found, for example, that the number of ducks and swans belonging to the European/Black Sea/Mediterranean population which remained to winter in USSR amounted to some 1,159,600, whereas in the countries of the Balkans and Mediterranean only 670,300 birds of this population were recorded. Similarly the figures for the West Siberian/Caspian/Nile population were 1,999,400 for the USSR and only 136,100 for the countries of the Near East. Again the USSR figure for the Siberian/Kazakhstan/Pakistan/Indian population was 277,300 against a total count of 167,500 for Pakistan and India. Thus, in all cases, the number of birds in the USSR appears to be much greater than the numbers recorded elsewhere, but in fact this does not reflect the true situation.

Direct observations and ringing data all point to the conclusion that the great majority of all species belonging to the waterfowl populations which have been studied, actually migrate to winter quarters beyond the boundaries of the USSR. I can show this by some examples. According to ringing data (Sapetin and Shevareva, 1959), recoveries of certain species ringed during their moult and reported in winter (November to March inclusive), were in the following proportions :

<u>Species</u>	<u>Reported in USSR</u>	<u>Reported abroad</u>
Mallard	73%	27%
Pintail	54%	46%
Teal	45%	55%
Garganey	16%	84%

In fact, the proportion of these and other species which leave the USSR in winter is much greater than these figures suggest, due to the low recovery and reporting rates of ringed birds in many countries of Asia and Africa. In addition, the fact that the above percentages are based on a five-month "winter" period tends to distort the picture since probably no more than two of these months should really be regarded as winter and it is known that very considerable numbers of wildfowl do not leave the USSR and move further south until December.

From the observations of B.V. Sabinevsky (1965), it is also known that at the peak of the autumn migration about 500,000 to 700,000 ducks are to be found at any one time resting on the sea near the mouth of the

Table 5 . The results of the January 1967 wildfowl census for the three main geographical populations of the U.S.S.R.

NOTE: Figures are in thousands.
 + = less than 100 birds. - = no data obtained.

Wintering Grounds	Dabbling Ducks	Diving Ducks	Geese	Swans	Coots	Flamingos	Total
A. EUROPEAN/BLACK SEA/MEDITERRANEAN POPULATION							
Ukraine, inland	10.8	0.7	+	-	+	-	11.5
Ukraine, Black Sea coast	503.5	195.2	2.8	15.0	38.5	-	755.0
North shore of Sea of Azov	7.4	2.5		0.1		-	10.0
South Azov shore & Kuban delta	129.3	71.2	1.6	0.6	43.1	-	245.8
Caucasus foothills	21.6	1.5	0.2	0.1	0.1	-	23.5
Western Transcaucasia	190.3	9.8	-		2.4	-	202.5
Total for USSR	862.9	280.9	4.6	15.8	84.1	-	1248.3
Recorded in other countries	532.5	133.1	?	4.7	?	?	?

Wintering Grounds	Dabbling Ducks	Dividing Ducks	Geese	Swans	Coots	Flamingos	Total
B. WEST SIBERIAN/CASPIAN/NILE POPULATION							
North of the Caspian	0.1	32.0	-	3.9	0.6	-	36.6
W. of Caspian - Deghestan	169.1	72.5	14.2	1.6	67.6	-	325.0
E. Transcaucasia - Azerbaijan	1140.8	116.8	40.9	4.3	187.1	4.6	1494.5
S. Transcaucasia - Armenia	12.5	0.2	0.7	-	1.8	-	15.3
E. shore of the Caspian	60.2	381.2	+	4.1	35.0	19.0	499.5
Total for USSR	1382.8	602.7	55.8	13.9	292.1	23.6	2370.9
Recorded in other countries	130.9	5.2					
C. SIBERIAN/KAZAKHSTAN/PAKISTAN/INDIAN POPULATION							
South Turkmenia	47.2	129.0	0.5	+	54.3	-	231.0
Mid- & lower Amu-Darya	11.0	0.8	0.2	-	4.6	-	16.6
Zeravshan river system	30.3	14.3	5.8	+	81.7	-	132.1
Surkhan - Darya	4.1	0.1	0.6	+	0.3	-	5.2
Upper Syr-Darya & Fergana Valley	14.5	0.3	0.9	-	0.6	-	16.3
Mid-Syr-Darya & Golodnaya Steppe	4.3	1.6	3.6	+	15.7	-	25.2
Issyk-Kul Lake	1.1	17.5	0.6	0.9	0.8	-	20.9
Alakol Lakes	+	0.2	-	-	-	-	0.2
Total for USSR	112.5	163.9	12.2	0.9	158.0	-	447.5
Recorded in other countries	136.4	31.1				?	?

Dnieper in the Chernomorsky State Reserve. Moreover, there is a daily change over in this population of the order of 30%, some birds leaving for the south and other new ones arriving. At its peak, this movement therefore results in the departure to the south of something between 160,000 and 230,000 birds each day and the peak period lasts considerably more than 10 days. Accordingly, at the lowest estimate, it follows that the number of wildfowl leaving the USSR in the Black Sea sector is not less than 2 million and may be much more.

Figures derived from counts by G.A. Krivosov (1965) show that in the spring between 7,200,000 and 10,500,000 ducks, geese and swans migrate across the seaward part of the Volga delta. If one assumes that no more than about 1,500,000 of these have spent the winter in Transcaucasia and that the majority of the wildfowl which have wintered in the Black Sea probably pass northwards to the west of the Volga delta area, one reaches the conclusion that about 80-85% of the ducks and nearly 75% of the geese passing the Volga delta in spring are returning from winter quarters beyond the limits of the USSR.

In the Kyzyl-Agach State Reserve on the western shore of the Caspian, the number of surface-feeding duck at the beginning of winter appears to be almost twice the number to be observed in the middle of winter and geese are four times as numerous. These differences represent about 1.5 million ducks, 1.4 million coots and 48,000 geese. In some of the harder winters, the main body of wintering birds depart for Iran or further south. The main autumn migration of wildfowl through this area lasts at least a month and the rough estimates which have been made put the figure of surface-feeding ducks at over 6 million which, together with an immense number of geese and swans, fly on southwards beyond the USSR border. Finally, the figures collected for a relatively minor fly-way which passes over the Milsk steppe, via the Ak-gel lakes, indicate that no less than 100,000 to 150,000 ducks and 100,000 geese pass by on their way to Iran and Turkey.

In Kazakhstan and southern Siberia, the main stock of breeding wildfowl leave the country in winter and only a quite small proportion remains to winter on the dams and reservoirs of Soviet Central Asia. There are many well-known fly-ways between Kazakhstan and the south and on one of them, which passes along the Ili river valley, V.F. Gavrin has recorded (1965) a diurnal passage in the spring of about 125,000 ducks and geese. On another route passing over the eastern end of Lake Balkhash, numbers were estimated at half a million and the total migrating south from the area must amount to several million.

An analysis of all the available data, of which some examples have been given above, definitely leads to the conclusion that only a small part of the total number of waterfowl breeding in the USSR remains in the country for the winter. For the European/Black Sea/Mediterranean population, it can be estimated at about 15%, for the West Siberian/Caspian/Nile population 20% and for the Siberian/Kazakhstan/Pakistan/Indian population no more than 5%. This readily explains the Soviet Union's great interest in the conservation and protection of the wetlands of the countries of the Near East, southern Asia and north-east Africa. These wetlands are undoubtedly the most important wintering grounds for some of the largest geographical populations of waterfowl which breed in the USSR.

RELEVANCE OF WILDFOWL BREEDING POPULATIONS OF
THE BARABI STEPPE TO WEST PAKISTAN

- by -

C.D.W. Savage

From the study of available ringing data it appears that one of the most important breeding grounds for wildfowl wintering in West Pakistan is the Barabi Steppe south-west of Novosibirsk in Western Siberia. The following information is taken from the Species List given in a detailed report on this area, to which I have added a column of comments on importance to West Pakistan:

<u>Species</u>	<u>Nesting</u>	<u>Passage</u> <u>Spring</u> <u>and</u> <u>Autumn</u>	<u>Importance to</u> <u>W. Pakistan</u> (see key below)
(<u>Branta ruficollis</u> REDBREASTED GOOSE)	-	v. rare	
(<u>Brant. bernicla</u> BARNACIE GOOSE)	-	v. rare	
(<u>Anser fabalis</u> BEAN GOOSE)	-	rarely	
(<u>Anseralbifrons</u> WHITEFRONTEDGOOSE)	-	commonly	
(<u>Anser erythropus</u> L. WHITEFRONTED GOOSE)-		rarely	
(<u>Anser anser</u> GREYLAG GOOSE)	commonly	-	**
(<u>Cygnus columbianus</u> BEWICK'S SWAN)	-	v. rare	
(<u>Cygnus cygnus</u> WHOOPER SWAN)	usually	-	
(<u>Cygnus olor</u> MUTE SWAN)	usually	-	
(<u>Tadorna ferruginea</u> RUDDI SHELDUCK)	v. rare	-	
(<u>Tadorna tadorna</u> COMMON SHELDUCK)	v. rare	-	
<u>Anas acuta</u> PINTAIL	usually	usually	*
(<u>Anas formosa</u> BAIKAL TEAL)		accidentally	
<u>Anas crecca</u> COMMON TEAL	usually	-	*
<u>Anas platyrhynchos</u> MALLARD	usually	-	*
<u>Anas strepera</u> GADWALL	commonly	-	**
<u>Anas penelope</u> WIGEON	usually	usually	*
<u>Anas querquedula</u> GARGANEY	usually	-	*
<u>Anas clypeata</u> SHOVELER	usually	-	*
<u>Netta rufina</u> REDCRESTED POCHARD	uncommonly	-	*
<u>Nyroca ferina</u> COMMON POCHARD	numerously	-	***
<u>Nyroca nyroca</u> FERRUGINOUS DUCK	uncommonly	-	*
<u>Nyroca fuligula</u> TUFTED DUCK	uncommonly	uncommonly	*
(<u>Melanitta fusca</u> COMMON SCOTER)	uncommonly		
(<u>Clangula byemalis</u> LONGTAILED DUCK)		in spring	
(<u>Bucephala clangula</u> GOLDENEYE)	uncommonly	uncommonly	
<u>Mergus albellus</u> SMEW	usually	-	*
(<u>Mergus merganser</u> GOOSANDER)	individuals	individuals	
<u>Oxyura leucocephala</u> WHITEHEADED DUCK	usually in	-	*
	south		

Key: ** of great importance (supported by ring recoveries).
 ** of great importance (assumed).
 * of relative importance. x of interest.

Nyroca ferina and Anas strepera were formerly the most numerous species in India and Pakistan. The reasons for their decline are not known but the importance to Pakistan of their conservation on the Barabi Steppe is obvious.

RESULTS OF THE RINGING OF BREEDING- SPECIES

AT LAKE MANYAS

by

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The valuable information which can be obtained by bird-ringing, not only in regard to migration and dispersal but also to population dynamics and productivity is now widely recognised. This paper summarises the results of ringing at the Manyas Bird Sanctuary in N.W. Anatolia, an important breeding station for waterfowl which was visited during the course of this Meeting.

When the Lake Manyas area became known in 1938, through the researches of the writer and Mrs. Kosswig, attention had at first to be concentrated on securing the protection of the colonies of breeding birds and preventing them from suffering disturbance through ignorance of their great value. It was only after the area was given the status of a national park and received official protection and support from the authorities of the Turkish Republic that it was possible to further the studies of breeding birds by starting a ringing programme.

Ringing of nestlings was carried out from 1955 to 1962 by Mrs. Kosswig, with the assistance of the Wardens, Mr. Kasif Kan up to 1958 and then Mr. Ali Kizilay. The rings used were those of the West German Vogelwarte Radolfzell. Altogether 1,222 nestlings were ringed, of which the most important for the purposes of this Meeting were :-

Spoonbill <u>Platalea leucorodia</u> :	414
White Stork <u>C. ciconia</u> :	137
Cormorant <u>Phalacrocorax carbo</u> :	78
Purple heron <u>Ardea purpurea</u> :	80
Little egret <u>Egretta garzetta</u> :	123
Grey heron <u>Ardea cinerea</u> :	12
Squacco heron <u>Ardeola ralloides</u> :	80
Night heron <u>N. nycticorax</u> :	165
Glossy ibis <u>Plegadis falcinellus</u> :	8
Greylag goose <u>A. anser</u> :	1

Of the 1,222 young birds ringed, 38 were subsequently discovered and reported to the Vogelwarte Radolfzell. This gives a percentage recovery of 3.2 as compared with the average elsewhere in similar operations of 4.3 to 4.5 per cent. Probably the reason for this lower percentage is that the birds ringed included a number of smaller species (e.g. 53 rollers Coracias caudatus), which are not regarded as game birds or shot, and the same may also apply to the smaller herons: for instance none of the Squacco herons was recovered, and only one each of the considerable numbers of Little Egrets and Night Herons which were ringed. If such smaller species are excluded, the percentage of recoveries

slightly exceeds that obtained under similar conditions elsewhere.

Of the 414 spoonbills ringed 21 were recovered, or about 5 per cent. These included a number of young birds recovered in their first year locally and so only of interest from a population viewpoint. On the other hand first-year birds were also recovered in the Sudan, near Karachi (Pakistan), at Basra, in Israel and in the Nile delta, an important indication of their dispersal. Perhaps of even greater importance were birds recovered locally in subsequent years, including two 2-year old birds at Lake Apolyont (30 km. from Manyas) and two 4-year old birds 5 and 30 km. respectively from Manyas. In addition a 4-year old bird was reported from Pazarcik in Bulgaria, 200 km. away. It cannot be known whether this bird may possibly have linked up with breeding birds from Bulgaria wintering on the Meriç delta or whether it would ultimately have returned to the neighbourhood of its birth-place at Manyas.

With regard to White Storks, it is unfortunate that the number nesting at Sigirci Atikköyü, a village near the Manyas sanctuary, has been much reduced in recent years because the villagers have replaced their reed-thatched roofs with tiles which give less suitable nesting sites and also because they seem to believe that storks do damage to the tiled roofs. Of the 137 nestlings ringed only three were recovered, one in the same autumn in the Sudan, one in the following spring in the Lebanon and the third eight years later in the town of Bandirma, 15 km. away.

The ringing results have supported the belief that cormorants do not usually move very far from their breeding-place : of 78 ringed seven were recovered, all except one in various places in western Anatolia, the one exception being a bird recovered, only three months after ringing, at Constanza in Rumania.

The information from the 80 purple heron nestlings marked indicates an interestingly widespread dispersal. Out of five recoveries, one was a bird found two years later at Krasnodar in the north Caucasus, a second and third also in that year turned up at Pazarcik, Bulgaria and Alexandria in Egypt, and a four-year old bird was reported from Kobuleti near Batum in the U.S.S.R.

The single recoveries already mentioned, of night heron (165 ringed) and little egret (80 ringed) were also of considerable interest. The night heron was found in the year of its birth at Krasnodar in the north Caucasus and the little egret, also in its first year, at Agrigento in Sicily.

To sum up, the results to date of the ringing of nestlings at the Lake Manyas sanctuary, which so far as is known was the first and only ringing experiment yet carried out in Turkey, may have made only a small contribution to our understanding of the manifold problems of dispersal and migration in this area, but one which has nevertheless already shown several interesting features. It is much to be hoped that volunteers willing to spend time and money in continuing this work at Manyas and other important breeding areas, will become increasingly available and ask for no other reward than the satisfaction of feeling that they are contributing to the knowledge of nature on which all true conservation must be based.

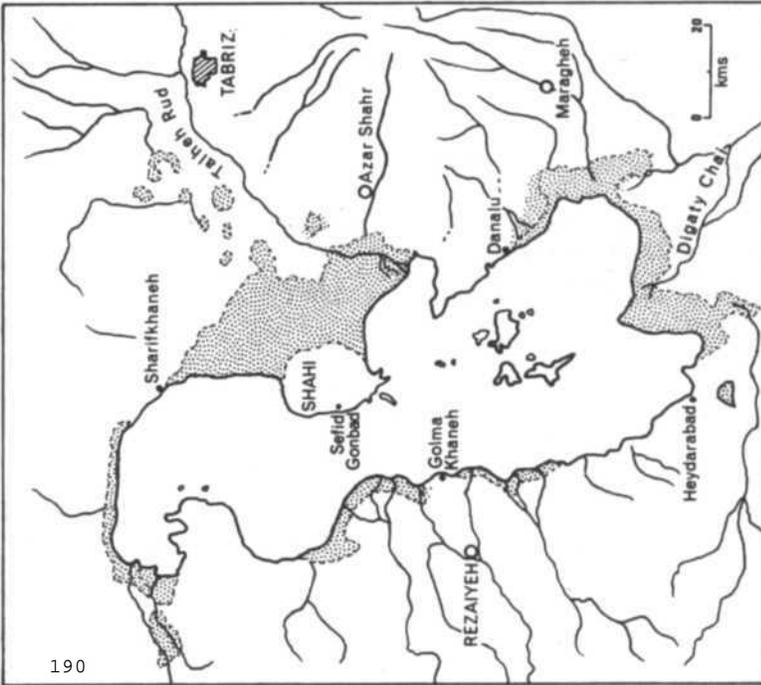


Fig.22. Lake Rezaiyeh and environs. The shaded areas are subject to seasonal flooding.

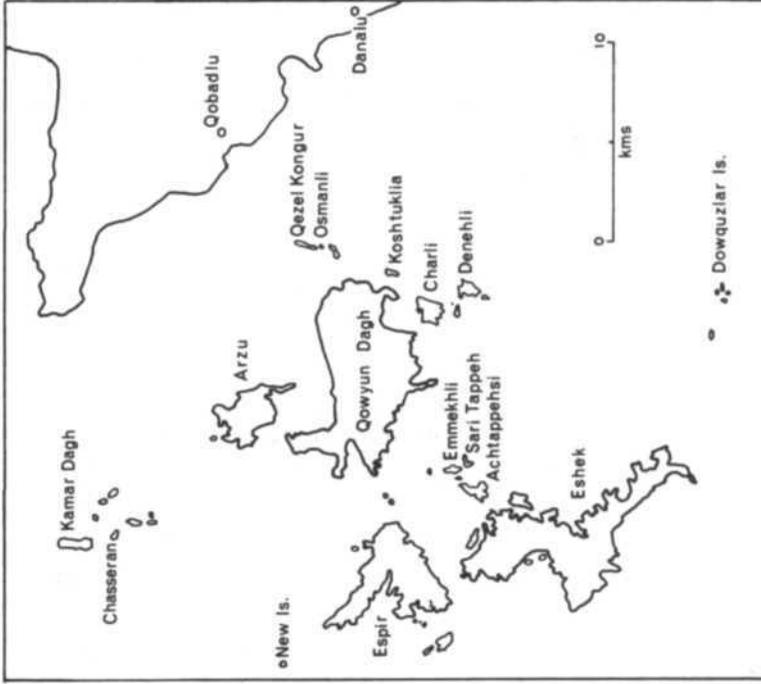


Fig.23. The islands in the southern part of Lake Rezaiyeh.

NODES ON SECONDARY PRODUCTIVITY IN THE
LAKE REZAIYEH ECOSYSTEM IN IRAN

- by -

C.D.W. Savage

Introduction

Common Shelduck (Tadorna tadorna), to a lesser extent the Ruddy Shelduck (T. ferruginea), and the Greater flamingo (Phoenicopterus ruber roseus) are summer visitors to Lake Rezaiyeh, in Iranian Azerbaijan, where they remain throughout the breeding season under conditions of extremely high salinity. In 1960 the Common Shelduck nested successfully in numbers but the Flamingo did not. Common Shelduck were observed to congregate for their moult. The purpose of this Paper is to describe the habitat in some detail, with special reference to the relationship between the lake salinity and the sole sources of food, the brine shrimp Artemia and the alga Enteromorpha intestinalis.

Lake Rezaiyeh, formerly Lake Urmia, is a large salt lake of over 5,000 square kilometers in extent, situated in Iranian Azerbaijan, 175 km. south of Mount Ararat and 100 km. west of Tabriz. Although reasonably accessible, it is remarkably little known even locally, except to those who believe in the medicinal properties of the lake-side mud near the town of Rezaiyeh or Sharifkhaneh. There are no fish in the lake and the popular belief is that the lake is 'dead'.

The author's studies of the area in 1960 showed that the lake was far from dead; at certain times of the year there were rich hatches of brine shrimp (Artemia) besides a growth of Enteromorpha intestinalis, an algal organism belonging to the family Ulvaceae. Moreover these both provide rich food for water fowl.

The lake, its salinity and food resources

Lake Rezaiyeh is shallow throughout, with some fifty-six islands. All except Shahi, which is now no longer an island, are uninhabited. Besides Shahi, the only island with fresh water is Qowyun Dagh, which has two springs. There are no boats on the lake except for an ancient steam tug which tows a lighter on a weekly service round the lake, mainly for the movement of cattle between the harbours of Sharifkhaneh, Golmakhaneh, Heydarabad, Danalu and Sefid Gonbad for Shahi.

The average depth of the lake is 5 metres and the maximum depth anywhere in the southern half of the lake is approximately 8 m. The lake has no outlet so that the seasonal inflow, which is mostly from snow melt, causes the lake to rise in spring by two metres or more. Evaporation then lowers the level again throughout the summer and autumn. At the same time, the variations in the volume of water cause a range of salt concentration varying from a maximum of more than 28% by weight to as low as 8%. By comparison, the Dead Sea, with its seasonal variation in level of 3 to 5 m. and a mean depth of 330 m., has a range of only 23 to 25% of

salts. The salts of Rezaiyeh are similar to those found in the sea, though in greater concentration. Other regular features are that the highest water levels occur in the first half of June and the highest water temperatures in August. The only food resources for water fowl, Enteromorpha and Artemia, are closely related to this annual cycle. Enteromorpha precedes Artemia and disappears earlier, around August.

Enteromorpha grows in dense flat colonies on stony or sandy ground along the shores of the lake and islands wherever the water is shallow. From elevated points the plant can be seen under water as a continuous dark green band. Strong waves and surf will tear it loose, after which it floats at a shallow depth and is distributed by wind and currents over nearly the whole surface of the lake. Plattner (1960) found that whenever there is a year when salt concentrations remain around or below 20%, Enteromorpha becomes so abundant that the whole lake looks like a vegetable soup. On the basis of random samples, he estimated in these years a production of 200,000 tons wet weight! In years of high salinity, as in 1960, Enteromorpha is relatively scarce.

Artemia begin to appear in April but do not build up in great strength till June. Successive hatches keep numbers up till September when they become noticeably fewer. Dr. Plattner found in the laboratory that they did not hatch out at salt concentrations higher than 11‰ from which he deduced that hatching must occur mainly around the mouths of perennial rivers where salt concentrations are lower. The only rivers of that description are the Tatau Cham and Digati Chai in the south. The Talheh Hud, although an important tributary in winter, dwindles to almost nothing in summer. It is significant that Dr. Plattner also found that salt concentrations sampled in the southern basin always lagged behind those taken simultaneously in the north, at Sharifkhaneh for example.

After hatching, Artemia appear to be moved northwards and spread over the lake by the winds and currents. In June and July, when there are often storms on the lake with strong winds from the south and south-west it is noticeable that the Flamingoes and Shelduck are mostly to be found round the Qowyun Dagh and the neighbouring islands where they can find shelter from the storms yet the winds bring them their food. Conversely, when there is less wind the Shelduck disperse and the Flamingoes are to be found more often in the open waters of the southern basin or alongside the southern shore.

Shelduck - their nesting and moult

In spring both Common and Buddy Shelduck (Tadorna tadorna) and (T. ferruginea) are to be found in the neighbourhood of Rahmanlu. At dawn and dusk they often come to small springs of fresh water near the water's edge. The Buddy Shelduck spend much of their time prospecting the gabbro cliffs and indeed local farmers vouched for the fact that in some years they did in fact nest there.

In 1960 however the Buddy Shelduck soon disappeared and the Common Shelduck appeared to concentrate mainly around the islands of Qowyun Dagh, Kamar Dagh and Chasseran. Nests were found in the crevices of the

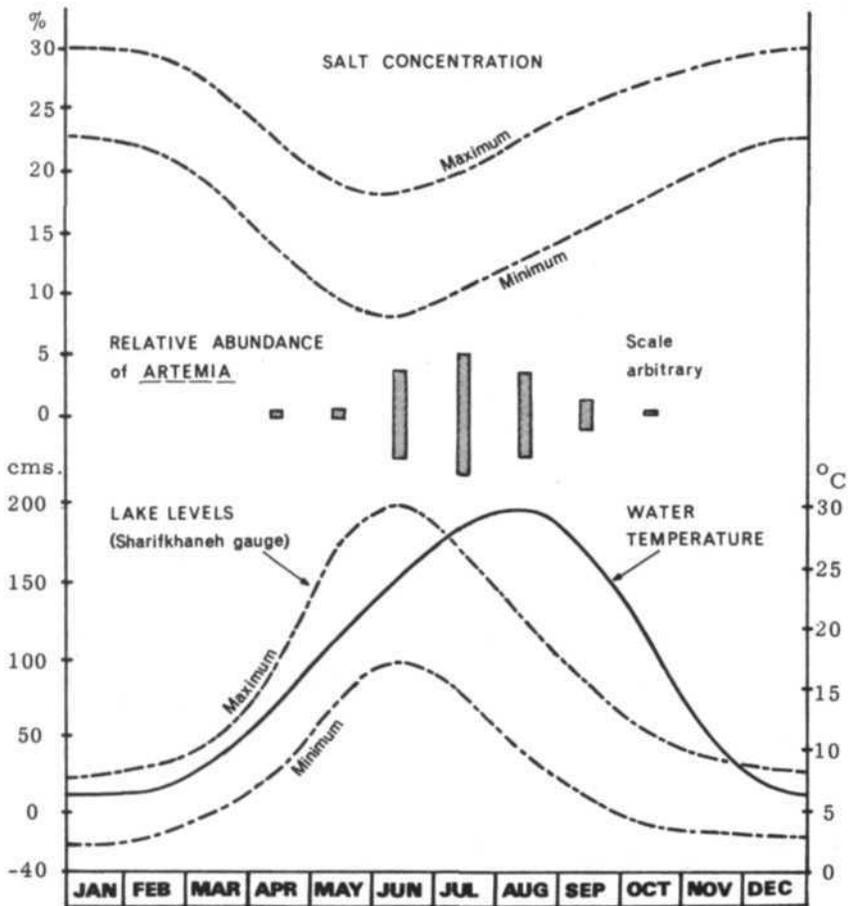


Fig. 24. Relationship between relative abundance of *Artemia* (brine shrimps) and the annual cycles of water level, salt concentration and water temperature of Lake Rezaiyeh.

limestone rocks and newly hatched ducklings were observed at the end of June.

It is significant that by the end of June there were quantities of Artemia to be seen and millions of their eggs floated on the surface of the water, often being blown into tight mats several square feet in extent. The Shelduck fed avidly in the open water, on or just below the surface, so it was not possible to say whether they were eating the Artemia or their eggs, but it was probably both.

At the beginning of July two or three pairs of Shelduck were found near Denehli but none further south. The only other bird life on the lake was a small party of Flamingoes (Phoenicopterus ruber roseus (Pallas)) swimming in the open water about 8 km. from land south of Qowyun Dagh. In 1966 however large numbers of Flamingoes were observed on the mudflats at the outfall of the Digaty Chai, and were apparently nesting.

By early August 1960 there were still quantities of Artemia but few eggs, and the rising salinity had caused white crusts to form on the rocks, sometimes up to eight feet above water level. Near Qezel Kongur (golden rocks) and the fist-like rock of Osman-li a flock of nearly three hundred Shelduck was found. Previously they had taken little notice of a boat within 15 to 20 yards, but now they swam off quickly or, when approached too rapidly, dived readily (see King 1960). Some birds were in immature plumage, but the majority were adults in moult. By 18 August the flock had dispersed over a wide area, but most were still flightless. By 8 September they had completely dispersed and thereafter only small parties were to be found around outlying islands.

The Flamingoes

The first Flamingo of the season was found in rough water west of Qowyun Dagh on 3 June. On 5 June a party of twenty to thirty was found in a fjord-like creek on the east of Eshek Island. This particular creek proved to be a favourite haunt of both Flamingo and Shelduck, no doubt because the prevailing winds brought their food supplies from the south and the creek provided still water. It was near here too that Dr. Plattner in other years often found the lake 'like vegetable soup'. Numbers soon built up to about a hundred at which they remained throughout the season. They would often be found resting on a sand bank at the southern tip of Arzu or frequenting the numerous little bays and creeks of that island or the neighbouring Qowyun Dagh.

At the beginning of September the lake level had fallen sufficiently to expose a small island about three miles north-west of Espir. In 1960 there were nearly 30 Flamingoes there, mostly flightless, as well as a number of Shelduck. This confirmed the observations of sailors who had passed the island in previous years and had spoken of catching flightless Flamingoes by hand.

The island itself was almost entirely crystallised in salt but it was interesting to find preserved in the salt the signs of about twenty Flamingo 'nests'. The mounds were unmistakable. It is conceivable therefore that they may have nested there in previous years, though it is also possible that the nests may have been only 'dummies' such as described by Brown (1959).

The remainder of the flock which were not moulting at the time and numbering about eighty, were to be found along the southern shore of the lake near Heydarabad. There were quantities of Enteromorpha in the shallow water, where they had been feeding.

Conclusions

It is clear that the presence of Shelduck and Flamingoes is connected with the abundant food supply in Lake Rezaiyeh. Judging only from behaviour, it appeared that Artemia and their eggs form the principal item of diet for the Shelduck, and that both Artemia and Enteromorpha provide the Flamingoes with theirs. Both species benefit greatly from lack of human interference.

Tailpiece

No description of Lake Rezaiyeh would be complete without mention of the surprising beauty of the islands in summer. As the concentration of salt increases, the crystals scintillate in the sun as they form on the surface and then drop to the bottom. The water is so clear that the bottom of the lake looks like a vast snow field as seen from an aeroplane. The shore lines are encrusted in salt, but in the little pools among the rocks one still finds the Artemia which appear golden in the sunlight. From a high point on Qowyun Dagh the colours of the surrounding islands are unbelievably vivid. Although the only water-fowl proper on the lake are the Shelduck and Flamingoes, there is plenty of other wild life. Avocets nest in early June on mud flats near Rahmanlu, Red-necked Phalaropes visit the fresh springs near Heydarabad on passage in early September, Red-billed Choughs nest among the cliffs of Qowyun Dagh and there are vast quantities of Rock Doves, many of which use a special pigeon tower at Rahmanlu which produces nearly a ton of guano a year for the owner. On Qowyun Dagh there were also wild Mouflon introduced in the time of Mozaferedin Shah during the last century (see Savage 1960). Qowyun Dagh was proclaimed a Game Reserve in February 1960, and in due course may become a National Park, for which it is well suited.

Acknowledgments

The author is grateful to the Wildfowl Trust for permission to adapt a paper on this subject published in their 15th Annual Report (Savage 1964).

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Agenda Item 3 : Wildfowl breeding areas
and productivity.

DISCUSSION

(a) The data from the U.S.S.R.

Dr. Isakov is to be congratulated on his very important contributions, which emphasize the great role played by Soviet scientists in the field of biogeography and show how vital this is to a proper understanding in the particular case of wildfowl distribution and numbers.

The similarity of environmental factors in the U.S.S.R. and Canada is striking and argues a need for the maximum comparability of approach. In Canada and the U.S.A. the methods used allow errors in the census data to be assessed and therefore the general value of results to be enhanced. The technique is one of 'stratified sampling., less intensive in areas with a low productivity of wildfowl and more intensive in high production areas. The same sample is repeated each year and, in high production areas, aerial photography is used to supplement ground observations. Errors are calculated both on an annual and seasonal basis and the population trends of the most important species are determined. Thus it is possible to define with some precision the impact of the wildfowl harvest and to fix seasons for harvesting and protection on a reliable basis (de Vos).

Although breeding areas may be similar, wintering areas in the U.S.S.R. are generally very different from those of North America. This year (1967) the winter counts were undertaken by about 800 observers and were assisted by the use of some 26 aircraft, in addition to which questionnaires were widely distributed. In wetlands which have a large amount of phragmites or other cover, aerial transects are not however very suitable and may give positively misleading results: future plans for helping to overcome this include the use of radar. For the present the figures given in the second paper concerning the percentage of wildfowl which remain to winter in the U.S.S.R., must be regarded as a rough estimate, a general view of the situation based mainly on what happens at four of the major points of exit (Isakov).

There is a considerable lack of agreement between figures obtained in Pakistan and other countries to the south of the U.S.S.R. and those which could be expected on the basis of Dr. Isakov's paper. Probably it will be some years before really reliable population estimates become available, though the intensification of census work in the breeding season which is being planned in the U.S.S.R. is a very welcome development. Meanwhile the first objective should be to find means of establishing a more accurate idea of trends rather than of the strength of total populations of species (Savage).

It is clear from the papers under discussion that Turkey is one of the most important countries, in relation to the need for organizing comprehensive and detailed wildfowl counts as soon as possible (Lea).

(b) Ringling programmes as a method of obtaining information.

The experimental ringing carried out at the Manyas Kuş Cenneti was suspended partly because it was not generally understood that the work was being done on a purely voluntary basis and partly because of the doubt whether it was justified in an area where pressures on the continued existence of the breeding colonies were still so great (Kosswig).

The establishment of a proper Hinging Scheme in Turkey is recognized as of a high priority, but it must obviously be very carefully organized and have an effective clearing centre, such as the Science faculty of Ankara University. Much thought has been given to the matter during the last eight years and the Ministries of the Interior and of Agriculture are now involved in the planning, one of the most important elements in which is the public education aspect, another being the tie-up with the International Ringing Committee. It would be better at Manyas to establish a separate zone for ringing work outside the boundaries of the Kuş Cenneti (Zihni Ereñcin and Lea).

(c) Implications of the Lake Rezaiyeh studies.

One of the first results of the study of this area was that the island of Qowyun Dagh was declared as a sanctuary and now the whole lake area except the one inhabited island has been given a reserve status (Eskandar Firouz).

Although detailed limnological investigation will eventually be desirable, the important immediate objective should be to get a preliminary analysis of the factors affecting the biology of the lake, for instance the variations in salinity which are linked with the fact that high water level occurs in June and maximum temperature in August (Savage).

It would be of great interest to know from the point of view of similar water bodies in Turkey what effect salinity has on birds and the tolerance of such a species as the flamingo (Seref Ozgul).

Much depends on the precise chemical composition and in the Camargue, for example, flamingoes tolerate up to 400 milligrams of salts per litre.

It would be surprising, as far as the flamingoes are concerned, if they are affected by the flush of Enteromorpha algae, since they presumably depend on micro-bacteria and crustacea (Cragg).

Certainly flamingo cannot use crustacean eggs such as those of Artemia, which are quite indigestible; they probably rely on micro-organisms in the mud of the lake bottom. Rezaiyeh, like some interesting lakes to the south, does call for intensive limnological study, since we know nothing, for example, of its history in past Pluvials, which could help to throw light on its present productivity cycle (Löffler).

FOURTH TECHNICAL SESSION

Wednesday 11 October 1967 : Ankara.

Agenda Item 4 : human influence on wetland, especially in relation to development, exploitation for food and sport, tourism and the conflicts of interest which arise from these activities.

In the Chairs Dr. J.B. Cragg.

Of the eight papers on which discussion of this item of the Agenda was based, five were reprints or summaries of previously published papers, tabled by or on behalf of the authors or editors with the kind permission of the publishers.

Reference to this material was largely due to the fact that the subject of influence on or modification of wetlands through human agency, had already received considerable attention at two previous technical meetings sponsored by IUCN and affiliated organisations in the last few years.

At the first of these, the Conference of November 1962 which launched the MAR Project, the sections devoted to the economic, scientific and moral reasons for conserving wetlands and to utilisation by and for wild-life of man-made aquatic habitats contained a great deal of material of relevance to the present discussion.

The second, namely Part I of IUCN's Tenth Technical Meeting held at Lucerne in June 1966, dealt with the ecological impact of recreation and tourism upon selected temperate environments. The latter specifically included 'aquatic biotopes' so that the paper on the subject presented by Prof. Dr. M.F. Mörzner-Bruijns was equally applicable and useful in considering one aspect of human modification of wetlands.

In these circumstances the procedure adopted in this section of the Report differs from that followed in the previous sections. Only brief summaries of the contents of the five previously published papers are given, as amplified in some cases by the introductory remarks of the authors, and these are followed immediately by the record of the points raised in the ensuing discussions.

The eight papers fall into three groups. First there are two which review the over-all value of unmodified or partly modified wetlands, especially from the angle of economic development and utilisation. Three papers then deal with that aspect of utilisation which particularly affects the wildfowl resources, namely hunting and harvesting. Professor Mörzner-Bruijna's paper from the Lucerne Technical Meeting takes up another aspect of utilisation, the use of wetlands for recreational purposes, and examines its impact. Finally, two papers discuss the effects of a very specialised example of human influence on wetlands. This concerns the deliberate introduction of nutria (coyppu) into wetland areas, both as a fur-bearing resource and also as a method of management for other forms of productivity, especially wildfowl.

(a) Wetland values

LIQUID ASSETS

IUCN Supplementary Paper No. 5.

This illustrated booklet, which was tabled at the Meeting, was published by IUCN in 1964. with the financial assistance of UNESCO. Its preparation and publication were undertaken in collaboration with IWRB as an integral part of the MAR Project, the work being entrusted to Mr. G.L. Atkinson-Willes of the Wildfowl Trust.

A French edition, 'R  sources m  connues', was published a year later and both editions are still available and can be ordered from IUCN headquarters (Secretary-General, IUCN, 1110 Morges, Switzerland) or from its London office (IUCN office, c/o. The Nature Conservancy, 19 Belgrave Square, London S.W.I.) at \$ 0. 70 (T.L. 7.00 or 6 shillings) per copy.

Introduction

Introducing the paper Mr. G.L. Atkinson-Willes stated that it was designed for distribution to officials concerned with watershed management, river and flood control, drainage and the supervision of estuaries and low-lying coastal areas, in order to present the case for regarding wetlands as a natural resource, comparable to forests and farmlands and essential to many activities. Like Project MAR which sponsored it, the booklet is mainly concerned with the fact that such a valuable resource is now so scarce that every effort must be made to preserve what still remains. Although, in the preparation of the booklet, this aim was chiefly thought of in the context of Western Europe, many of the arguments put forward seem equally applicable to Turkey and the countries of South-West Asia.

The subject is dealt with under a number of headings - wetlands and recreation, science and education, the economics and dangers of drainage, the constructive use of wetlands and their conservation and management for that purpose -, but the case for the wise use of the resource rests basically on four considerations, ethical, aesthetic, scientific and economic. Ethically we are answerable to future generations for what we do to the natural world around us: man alone has power to change his environment to suit his needs and this, in itself, imposes a moral responsibility. Aesthetic considerations are closely linked with the enjoyment and recreation that wetland areas with their abundant wildlife are specially able to provide. Scientifically, wetlands provide an unlimited field for education and research: amongst their special characteristics, fitting them for natural laboratories, are the diversity of plants and animals, the complex relationships between communities, the high rate of productivity, the rapid changes in natural succession, and the subtle differences which result from the interplay of physical factors.

Finally and perhaps most important in relation to present items of the agenda, the economic argument is that wetlands can best be used by

exploiting their natural assets. Already the provision of water for industrial and domestic use has become a major problem, as pressing in some countries as the problem of feeding human mouths. In wetlands we have not only a natural reservoir of water but also a great potential source of food, as yet largely untapped, which needs to be scientifically explored within the next decade if it is not going to be too late and if the source is not to be wasted. Drainage may be designed to produce more food-producing farmland, but it can too often give rise to undesirable results, lowering of the water table, with impoverishment of existing farmland, wind erosion of top soil, increased run off leading to water erosion and, in fact, losses caused by unforeseen side effects which more than off-set the advantages gained. This is now being realised in many places and is so obvious, for example, in parts of North America that the authorities are re-flooding drained areas.

'Liquid Assets' makes it clear that a sensible programme of wetland conservation has to compromise between conflicting interests: there can be no question of setting aside all such areas as wildfowl refuges. At the same time in any compromise, we are entitled to expect and ask that what can be described broadly as the wildlife interests receive full and proper consideration.

Discussion

The word compromise is perhaps too often used: the essential thing is that wetlands should be looked at from the point of view of optimum utilisation, which is only compromise in the sense that it may involve multi-purpose use (Cragg).

Compromise may be based on a position of weakness or on positions of strength. A position of strength is assured if biologists work closely with economists and establish the facts of economic land use. In doing so they should have regard not only to direct returns, such as those of hunting and harvesting, but also to more abstract factors such as aesthetic and recreational benefits, which can nevertheless now be precisely assessed by methods developed in America (de Vos).

What is one to do about a specific case of conflicting interests such as one that occurs in the vicinity of Lake Apolyont, where the villagers claim that the wild geese do damage to crops, especially to autumn-sown wheat? (Necat Gülgün).

This is a case where compromise may be the right word, the balancing of any losses by the gains obtained from harvesting the geese and from the visitors who come to shoot or watch them, but damage can also be reduced to a tolerable level if enough wetland areas exist for geese to be widely dispersed instead of dangerously concentrated (Atkinson-Willes).

Provided there are places to which geese can move, there are methods available for shifting geese from areas where they are doing damage, without necessarily destroying them (Berry).

In the Netherlands it has actually been shown that grazing by geese can sometimes improve or at least not reduce a wheat crop by inducing

multiple-stem growth (Mörzer-Bruijns).

A difficulty in Turkey is that damage by geese is both widespread and goes on for a considerable part of the year, so that preventive measures are difficult to apply. However, the other side of the picture is that, although wetland drainage has sometimes resulted in greatly increased and profitable production, in other cases the reclaimed land has become useless, especially where inefficient irrigation methods have led to excessive alkalinity. The real answer is that comprehensive ecological, biological and social investigations are necessary in deciding on the management policy, conservation or drainage or a mixture of both, for every wetland area (Gülgün and other speakers).

NOTES ON THE ECONOMIC VALUE OF WETLANDS
BASED ON EXPERIENCE IN THE NETHERLANDS.

- by -

M.P. Mörzer-Bruijns and V. Westhoff.

This paper was tabled at the Meeting but unfortunately could not be reproduced and circulated to participants. It was first presented at the Conference which launched the MAE Project in November 1962 and was published in the Proceedings (IUCN Publications New Series No. 3 obtainable at \$ 5,00 (T.L. 50.00 or 41s. 6d.) a copy from the Secretary-General, IUCN, 1110 Morges, Switzerland).

For the purposes of this Report the following summary of the paper, which is included for ease of reference, gives monetary values in dollars and Turkish Lira in place of the Dutch florins quoted in the published paper.

Summary

The following are the main economic returns obtained from wetland areas in the Netherlands:

1. Wildfowl Shooting

Wildfowl are hunted in most of the marshes and wetlands. The rent for a shooting area is normally about \$ 0.70. or T.L. 6.30 per ha., locally much more. Out of 12 million inhabitants 22,000 sportsmen have shooting licences: about 80% of them shoot wildfowl. A shooting licence costs \$ 20.70. or T.L. 145.00. The number of ducks shot or captured is 500,000 - 600,000 valued at between \$ 220,700 (T.L. 1.98 million) and \$ 276,000 (T.L. 2.5 million).

2. Fishing

There are 1600 professional fishermen and 650,000 sport fishermen using the 100,000 ha. of inland fishing waters, the total rent paid for which would probably work out at about \$ 138,000. Moreover, sport fishermen contribute about \$ 222,700 each year to the organization which maintains and improves inland fishing, and pay another \$ 413,800 a year for special licences. The yearly yield obtained by the professional fishermen is valued at between eleven and twenty-eight dollars (T.L. 100 and 250) per ha. : the yield obtained by sport fishermen is not known.

3. Timber crop

Alder (Alnus glutinosa) and birch (Betula) have no economic value. Willow (Salix spp.) and ash (Fraxnus) give a gross yield valued at between \$ 27.50 and \$ 165.00 (T.L. 250 and T.L. 1,485) per ha. per annum. But this is off-set by cutting and transport costs leaving little or no net profit.

4. Reed (Phragmites communis) crop

Reeds are out on about 1,700 ha. out of the 6,000 ha. of inland marsh in the Netherlands and on about 2,000 ha. along the dikes. The normal yield is valued at about \$ 180 or T.L. 1,670 per hectare per annum. The total gross profit is of the order of \$ 700,000 or T.L. 6.3 million per annum.

5. Rush (Schoenoplectua lacustris) crop

About 500 ha. are of importance for this crop, the yield from which is valued at about \$ 165 or T.L. 1,500 per hectare per annum.

6. Moss (Sphagnum) crop

Very locally areas of sphagnum are leased, at a rent of between \$ 2.75 and 6.90 (T.L. 25 and T.L. 62) per ha. per year, for exploitation of the moss for horticultural purposes.

7. Wild grassland

Yields are very low. The cost of mowing in one known case was barely covered by the profit from the sale of the crop which worked out at about \$ 82.50 or T.L. 742.50 per hectare.

8. Tourism

The economic return under this head from wetlands is high, large sums being paid for the use of such areas for recreational purposes. In 1962, 40,000 sailing boats and 17,000 motor boats were registered, owned by members of water-sports societies.

DISCUSSION

The economic return from tourism in the case of the Dutch wetlands is not assessed in monetary terms, though it is said to be high. It is often a complex matter to calculate it exactly, though in outstanding cases such as that of Kenya, where tourism has been largely based on wildlife resources, the income it produces is placed very high in the national budget. What is certain, however, is that wetlands are capable of earning substantial tourist revenue even from plain viewing, especially when as in the case of several in Turkey they have spectacular birds such as pelicans, cranes and flamingoes. The great success of the Lake Nakuru National Park in Kenya stems very largely from its flamingo population and the Tuz Golu could easily be made into the same kind of attraction (Elliott).

(b) Hunting and wildfowling

TÜRKİYE TURİZMİNDE AV HAYVANLARI VE AVCILIK
'GAME AND HUNTING IN TURKISH TOURISM'

published by

the General Directorate of Forests of the Turkish
Ministry of Agriculture.

This illustrated booklet in Turkish was tabled and copies were presented to all participants in the Meeting. The following synopsis in English emphasizing the aspects of special relevance to the subject of wetland and wildfowl management and conservation was also circulated.

"This 56-page booklet was recently published by the General Directorate of Forests in collaboration with the department of Tourism. Although it is principally concerned with the larger mammals and with game-birds, it mentions duck and geese and their wetland habitats, within the game-bird category, and also gives a useful general picture of policy and legislation applied in Turkey to the management and exploitation of wildlife. Special attention is paid to the problem of predators, the maintenance of stocks for sportsmen and the principles of sustained yield, the protection of species during the breeding season and the rehabilitation of depleted species by temporary bans on shooting, all of which are equally applicable to the wildfowl of wetland areas.

The booklet begins by reviewing the present situation of game animals in Turkey. It deplores the spendthrift attitude which has prevailed towards their exploitation, in the apparent and mistaken belief that stocks are inexhaustible. This is reflected by the fact that unwise and unfair hunting methods are still sometimes adopted, such as the wholesale collection of eggs of nesting game-birds, shooting from hides at water-points where animals congregate during drought or at places where they have taken refuge from snow and ice during winter, shooting animals dazzled by the headlamps of motor-cars etc. Moreover, no methodical effort is made to control and keep down the number of predators, such as foxes, snakes, crows and magpies. Mention is also made of an important fact, which is very relevant to the present Meeting, namely that nearly all game-animals are very dependent on undisturbed access to water and also use reed-beds and other vegetation of wetlands for cover.

The conclusion reached is that if the hunting regulations are properly observed by everyone and if much more effort is made to control predatory species, Turkey's magnificent game resources would not only be maintained but could well be considerably increased. It is emphasised however that waging war on predators is not, by itself, sufficient to achieve this. Every species has a natural ratio of increase, on which it is essential that hunting should be based, and if this is not done and hunting pressure exceeds the natural increase, the species will inevitably decline and may finally become extinct.

The next section of the book summarises the laws and regulations

on hunting, which are based on Law 3167 enacted on 5 May 1937. Under the Law all animals are divided into three categories:

- I. Those which can be hunted at any time, which include - (a) Mammals: wolf, wild boar, leopard (subject at present to a temporary ban), lynx and hyaena; (b) Birds: crows; (c) Others: snakes, tortoises.
- II. Those which may only be hunted seasonally, including (a) Mammals: wild cat, marten, polecat, squirrel, weasel, stoat, otter, badger, beaver, fox, bear, gazelle, mountain goat, roe deer, hare; (b) Birds: partridge, blackcock, cock pheasant, peacock, francolin, quail, duck, geese, swan, crane, marsh-birds, woodcock, bustard, raven and oriole.
- III. Those of which the hunting is forbidden, namely - (a) Mammals: red deer, mountain sheep, the young of roe deer and mountain goat, bats, hedgehog; (b) Birds: stork, rock partridge, dove, kestrel, hen pheasant, greyhen, eagle-owl, tawny owl, nightjar, cuckoo, woodpecker, bulbuls and some warblers, wren, swallow and starling.

Article 3 of the Law empowers the hunting Commissions to make additions or deletions to these lists.

Article 4 establishes the season when animals in Category II may not be hunted as April to July.

All hunters must have and carry a permit from the Prefect or provincial Director, which is however valid throughout the country, and no persons under 18 or of unsound mind may carry a gun.

Article 16 of the Law vests the supervision of hunting in central and provincial hunting Commissions responsible to the Forest Department. The Central Commission's Chairman is the Minister of Agriculture and its members include the Directors of Forests, Veterinary Services and Agriculture and two representatives of Hunting Clubs, selected by the Minister. Provincial Commissions comprise the Provincial governor, the Provincial heads of the departments represented on the Central Commission and two local hunting club members appointed by the governor.

The duties of the Commissions include general supervision of schemes for breeding and increasing stocks of game, predator control and the enactment of regulations to outlaw unsporting methods of hunting (traps, poison, dynamite etc.) and to suspend hunting of endangered species or even all hunting in a particular locality.

The Central Commission meets annually before 1 August and scrutinizes Provincial decisions. It holds overriding authority and when it met in July 1966, for example, it laid down a number of special regulations and rules for guidance, including -

- (1) Suspension of hunting of roe-deer, gazelle and chamois for one full year;

- (2) All Provincial Commissions to review their regulations for animals which may be hunted seasonally;
- (3) Pheasants to be specially protected in many localities where they are rearing extinction;
- (4) Special measures to be taken to protect francolin which are becoming extinct due to non-observance of the hunting rules and habitat destruction;
- (5) Shooting of leopard to be suspended until August 1967.

Penalties for infringement of hunting regulations are stated to be fines ranging from T.L. 10 to T.L. 100 and up to 3 months imprisonment with light labour, following arrest by any grade of game guard and conviction by the appropriate authorities before whom the culprits must be brought, together with the weapons used and the game killed.

The next section of the booklet reviews the principal game-animals; each is illustrated and a few details of status etc. are given. Of ducks and geese it is stated that the main threat is reduction of their habitat by drainage and diversion of water into canals, excessive reed-cutting, excessive use of decoys and the collecting of eggs of breeding birds.

There follows a section in which the principal predatory species are discussed and illustrated. It is suggested that wolves, jackals, foxes, snakes, falcons and crows are always inimical to game animals and justify constant attack at all times of year. However, in the case of 'falcons', which on the basis of the illustrations can be interpreted as also including Accipiter species, the suggestion is modified by a reminder that they and such birds as kites play an important part in controlling mice, snakes and various insect pests, so that this should be taken into account and, it is to be hoped, exclude any policy of extermination. It is also indicated that eagles should only be killed at times when they become excessively numerous and harmful.

The last page of the booklet carries a convenient summary of the hunting laws and regulations and ends with an appeal to all hunters to observe these rules carefully so that good hunting may be enjoyed every year".

DISCUSSION

This publication, for which I was responsible, was intended for all grades of hunters, shooters and sportsmen, whether local residents or visitors and was basically aimed at getting the status of game animals in Turkey and the game laws more widely known and properly understood. With regard to the comment in the synopsis on the inclusion of eagles among predatory species which need to be kept under control, we have evidence from the Konya region that they do a certain amount of damage, especially to young lambs, but taking the country as a whole it is probably not too serious (Turan).

The brochure is of course also intended for tourists including foreign tourists and it is to be hoped that it will be translated. A new hunting law is being prepared and the scientific committee which is involved in this, in consultation with Universities and hunters, is aiming to produce a revised handbook with a comprehensive list of mammals and birds with their scientific names etc. (Hug).

The new law is still only in draft and it may still be some time before it is enacted (Gülgün).

WILDFOWL MARKET HUNTING
IN NORTHERN IRAN

Editorial Note

Two papers on this subject were presented. The first was a reprint of the article by Mr. C.D.W. Savage, published in 1963 in the 14th Annual Report (1961-2) of the Wildfowl Trust (obtainable from the Wildfowl Trust, Slimbridge, Gloucestershire, England, price 17s. 6d.), which gives an account of observations and data collected on two visits in 1957 and 1959. The second, by Mr. Eskandar Firouz, gives an up to date summary of the situation ten years later in 1967.

Mr. Savage's account, illustrated by maps, drawings and photographs, describes his experiences during his 1959 visit, on which the particular aim was to study the varied and remarkable methods used to capture wildfowl in the Gilan and Mazanderan provinces of Caspian seaboard of Iran. In a detailed appendix the annual duck harvest in these areas is analysed and estimated figures are given of the number of birds taken by the different methods employed in each of the main centres of operation.

For the purposes of the present Report and with the kind permission of the Wildfowl Trust, the description of the wildfowling techniques is very briefly summarised and only the table showing the analysis and estimation of the annual harvest is quoted. But the section of the paper relating to the problems of conservation, which it is particularly interesting to compare with the more recent developments in the situation described by Mr. Eskander Firouz, is given practically in full.

(a) Summary of paper tabled by

Mr. C.D.W. Savage

Wildfowl are very abundant in winter in the marshes of the Caspian provinces of Gilan and Mazanderan in northern Iran, where there is an important wildfowling industry: over 1,200,000 ducks may be killed in an average season. Ducks are taken in a variety of ways, which were personally investigated in 1957 and 1959. The principal method of capture is by means of a net, gong and flare at night. Mist-nets and clap-nets sited at pools to which wild ducks are attracted by trained decoy-ducks are also widely used. Long flight nets and the calabash method are of minor importance. Shooting, though increasing, accounts for only about 9% of the kill (110,000 ducks).

The estimated annual harvest of ducks in the two provinces can be summarised as follows:

<u>Location</u>	<u>Method</u>	<u>Remarks</u>	<u>Kill in average year.</u>
GILAN			
Mordab villages	Met, gong & flare	250 boat teams x 3-4,000	875,000.
Near Rasht	Decoy ponds	42 x 500	21,000.

<u>Location</u>	<u>Method</u>	<u>Remarks</u>	<u>Kill in average year.</u>
Mordab villages	Long flight nets	3 x 750	2,250
	Short flight nets	150 x 200	30,000
	Calabash method	no details, say	350
Throughout	Shooting	Based on sales of lead shot	82,500
MAZANDERAN			
Fereydun Kenar	Decoy ponds	85 x 400	38,000
	Teal nets	180 x 250	45,000
Bisheh Sar etc.	Net, gong & flare	incomplete estimate	4,000
	Teal nets	60-70 x 300	20,000
Zarrin Kola-Qajar Kheyl	Net, gong & flare	190 x 300	57,000
	Flight nets	100 x 100	10,000
Throughout	Shooting	Based on sales of shot & powder	27,000
TOTAL			1,212,100

Problems of conservation

In the Caspian region wildfowl are hunted not only by sportsmen but also by the farmers of Gilan and Mazanderan. To the farmers wildfowl are a crop to be harvested as assiduously as their cotton or beans. The total annual harvest in an average year is estimated (as at 1959) at nearly one and a quarter million duck alone, worth nearly a hundred million Rials (£500,000. or TL 10.8 million). This is a fact that needs consideration in drafting conservation measures.

The problem of conservation of the wildfowl populations in Iran is different from that in many other countries, as the numbers that remain to breed are almost negligible. Thus there is no means of increasing stocks by protection of breeding grounds. Conservation measures must therefore be limited to control of the kill and provision of refuges. The traditional methods of wildfowling without firearms depend essentially on refuge-like conditions and possibly the most effective means of improving the wildfowl situation in northern Iran is to encourage the continuance of the traditional industry as long as possible. In Japan, where until 1945 there existed a wildfowl industry of comparable scale, the annual harvest quickly fell from about a million to about 200,000 when the traditional hunting preserves were abused. Today such preserves as remain are officially encouraged, because their value as refuges is more generally appreciated. Moreover where the farmer is directly and financially interested in the sanctity of the hunting preserve, his co-operation in maintaining it is assured. It should also be noted that

the hunting methods used in north Iran avoid the wounding of birds and other undue cruelty.

A world-wide problem in relation to wildlife is destruction of habitat. In Gilan the Mordab and its southern preserved reed beds are the crucial features. Fortunately, in addition to the wildfowling interests, it has been found that the lagoon is one of the principal breeding grounds of the 'mahi sefid' or White Fish *Rutilus frisii kutum*, commercially one of the most important fish after the Sturgeon. Though it is feasible to drain and reclaim the Mordab, it is unlikely that any further lowering of the water level will be allowed on account of the serious effects this would have on the fisheries. In regard to the southern reed-beds it is understood that the Game Council are very much aware of their value and have already taken measures to preserve them from shooting.

In Mazanderan, even fifty years ago, the greater part of the coastal plain was poorly drained semi-swamp forest. With the pacification of the area development has been rapid until, now, 86,000 ha. are under rice cultivation. The only obstacle to further reclamation is availability of water supplies for irrigation. The importance of this to wildfowl is that, because of the difficulties of water supplies, over 11,000 ha. of good land have to be used for some 400 shallow reservoirs or 'ab-bandans', many of which are ideally suited to waterfowl needs. If, as seems likely at some time in the future, dams are built to develop the irrigation potential of Mazanderan, then it is certain that most of these ab-bandans will have to be ploughed up, very much to the detriment of the wildfowl. But it need not be catastrophic. At Fereydun Kenar the duck hunting preserves achieve considerable success by merely flooding selected paddies. The same could be done elsewhere, but the key to ultimate success in maintaining stocks would seem to be the provision of refuges.

(b) The present situation
 by Eskandar Firouz

A narrow plain, averaging perhaps 30 kilometers in width, follows the curve of the Caspian Sea in northern Iran from the border of the Azerbaijan S.S.R. in the north-west over a distance of some 700 km. to the frontiers of the Turkmen S.S.R. in the north-east. This, the Caspian littoral, is characterised by a humid to sub-humid climate with moderate temperatures, high precipitation and a consequent luxuriance in palae-arctic flora and fauna.

Many rivers and streams debouch from the nearby Elburz Mountains and, flowing through the plain, provide abundant water before finding their way to the Caspian. Rice is the principal agricultural crop and, hence, much of the land is flooded with shallow paddies. Moreover, reservoirs are created in many areas as a safeguard against dry periods. There is also a large natural marsh and wetland complex at the western end of this littoral called the 'Mordab' of Pahlavi and, at the opposite end, a large lagoon in the Caspian formed by the Mian Kaleh peninsula in the north-eastern part of the province of Mazandaran. It may be summarised that conditions are excellent for waterfowl of all species.

Hundreds of thousands of palaeartic waterfowl use these wetlands as wintering grounds as well as for passage during the fall and spring. Indeed, in past years when habitat conditions were superior, it was estimated that the migrant wildfowl coming to northern Iran numbered in excess of twelve million ducks. For generations, therefore, a large wildfowling industry has been in existence, employing nets, traps and firearms to obtain primarily ducks and geese for the market. Their methods were sufficiently efficient to result in an annual harvest of well over a million ducks alone not more than fifteen years ago.

During the past generation much of the wetlands area has either been reclaimed by drainage or simply dried up as a result of the progressive sinking of the level of the Caspian Sea (amounting to approximately seven feet over the past 30 years). During this period the population increased greatly, as did the pressure of hunting resulting, above all, in the constant disturbance of the habitat of the wildfowl. This, together with the reclamation of large areas of the natural wetlands, has no doubt created more harm than the actual netting and shooting and has substantially contributed to the reduction in the number of wintering wildfowl.

As a part of an overall conservation programme, the Iran Game and Fish Department (formerly known as the Game Council of Iran) enacted certain game laws and regulations to control the unchecked hunting of wildfowl. Among other items, aerial nets and traps as well as the use of motorised vehicles were prohibited. Equally, shooting was confined to daylight hours while every hunter must be in possession of an appropriate licence.

Market hunting continues to function, but with a rather reduced annual harvest. For the time being, the Game and Fish Department does not wish to discourage the wildfowlers, for these, by the very nature of their work, provide some of the finest refuges available to wildfowl in Iran. This is achieved through the agency of the reservoirs (called 'ab-bandans') referred to above, which form attractive habitats for the birds and are jealously guarded by their owners to ensure security for the wildfowl and consequently success for themselves in their traditional means of catching their ducks.

'Net, gong and flare' is the most typical method employed. It has been described in the paper "Wildfowling in Northern Iran" (Savage, 1963, summarised above) and it is sufficient to repeat here that this method creates almost no disturbance; the ducks do not see the men on the boats and no injured birds are left behind.

Without these 'ab-bandans' Iran would lose some of the most important wetlands suitable for wildfowl. Hence, the Game and Fish Department must acquire terrain of this nature in the near future to offset the gradual diminution of 'ab-bandans' - for reservoirs. Until such time, of course, the Game and Fish Department will continue to encourage the 'ab-bandan' system. Moreover, the Department obtains some revenue from the fees paid by the owners for netting rights and also makes use of certain 'ab-bandans' for the ringing of ducks.

Shooting of wildfowl is carried on throughout the Caspian littoral,

but once again the important areas are the 'Mordab' and, to a lesser extent, the lagoon in the south-east corner of the Caspian. Professional hunters use boats or blinds and will shoot coot as well as ducks and geese. Swans and flamingoes are completely protected, but there are no restrictions on other species of wildfowl.

Among the techniques for capturing waterfowl none is as effective as the 'net, gong, and flare' method mentioned above, but its effectiveness is subject to suitable weather conditions. Rainy, windy and moonlit nights are shunned and thus the wildfowler may lose some 15 nights in every month. An analysis of the season will show that there are approximately 50 effective netting nights, and our observations at the present day indicate that the average nightly catch can be estimated at between 50 and 100 ducks. These figures can be applied to a total of some 50 'ab-bandans' in Gilan and Mazandaran and result in a harvest of the order of 200,000 ducks per year.

Other netting methods and shooting are now estimated to account for some 50,000 additional birds, giving an annual total catch of 250,000 ducks for northern Iran.

DISCUSSION

It will be noted that the present day estimates arrived at in my paper are about a quarter of those calculated by Mr. Savage ten years ago. There is no doubt that the wildfowl population has been decreasing every year, and especially and quite drastically during the last four or five years. This is not attributable to excessive hunting, but to the decreasing wetland habitat. The surface area of wetlands has been reduced by 30 - 40%, due to reclamation and a 7-foot (2.3m.) drop in the level of the Caspian. As has been stated one answer is to create special wildfowl refuge areas, following the excellent pattern of the traditional 'ab-bandan', and this year the Iran Game and Fish Department is planning to establish the first reserve of this kind covering 5,000 ha. Meanwhile the traditional methods are being positively encouraged, for example by charging a minimum licence-fee for 'market hunting' - in fact we plan to abolish the fee altogether (Firouz).

In answer to further questions Mr. Eskander Firouz added:

It is difficult to forecast the probable extent of any further reduction in the wetland areas. Very recently there has even been a small increase of two or three per cent. and if this means an upward trend in the level of the Caspian, there could be a substantial increase.

The most important species from an economic point of view are Anas platyrhynchos, Anas crecca, Anser erythroptus and Anser albifrons, but all are valuable and we would need a harvest of about 2 million ducks to satisfy the demand. The decrease in wildfowl numbers cannot be attributed to the use of toxic chemicals such as insecticides in Iran, since none are in fact applied in the Caspian littoral zone.

(c) Impact of recreational activities

Editorial Note

As a basis for discussion of this aspect of 'human influence' which as several speakers pointed out is still of comparatively rare incidence in the countries of the region and, therefore, not yet studied or documented under local conditions, it was necessary once again to make use of one of Professor Mörzner-Bruyns's detailed analyses of the situation elsewhere, very recently published in the Proceedings of IUCN's 10th Technical Meeting held at Lucerne in June 1966. That Meeting was devoted to the theme "Towards a new relationship of man and nature in temperate lands" and the subject of Part I was "the ecological impact of recreation and tourism upon temperate environments". Professor Mörzner-Bruyns's contribution to this part of the Lucerne Proceedings is to be found in IUCN Publications new series No. 7, obtainable from the Secretary-General, IUCN, 1110 Morges, Switzerland, price \$ 6.00 (T.L. 60.00 or 50 shillings).

Introducing his paper Professor Mörzner-Bruyns summarised the points of actual or potential relevance in the laddie Bast and South-West Asian situation and, for the purpose of this Report this summary has been adapted together with appropriate extracts from the paper.

THE INFLUENCE OF RECREATIONAL ACTIVITIES
ON AQUATIC BIOCENOSES

- by -

M.F. Mörzner-Bruyns.

This paper, of which the full text reprinted from the Proceedings of IUCN's 10th Technical Meeting has been tabled and distributed to participants in the present Meeting, was aimed at analysing certain problems of management of waters and wetlands which occur rather generally in the Netherlands and other countries of the temperate region. However, I think they are of interest also for the region with which we are now concerned. Although recreation activities near or on water, especially inland waters, may not yet be very important, for example, in Turkey, it is almost certain that they will increase and that in the near future, at least locally, they will constitute the same kind of problem as they already do in many other countries. Consideration of this problem, before it actually occurs on a big scale, may well help Governments concerned to anticipate and prevent damage and disturbance of valuable wetland assets and to ensure that these areas are put to optimum multi-purpose use.

My paper was concerned with the impact of recreational activities, but by way of preface I would like very strongly to emphasize that this is never likely to be as serious a threat to wetland areas as reclamation or even irrigation schemes when these are applied to the whole of an area for the purpose of single-use development. Nor is the impact of recreational use, although it does include pollution, anything like so serious a threat as pollution from other sources, especially sewage,

detergents, pesticides and other toxical chemicals, and the discharge of industrial wastes.

The paper classifies the types of recreational activity which need to be considered, under the following main heads: waterside recreation (such as swimming, sunbathing, picnicking etc.) sailing and boating, fishing and hunting (including recreational collecting of plants and animals), and camping and all the building operations which go with the provision of recreation facilities such as hotels and esplanades and jetties. I might add here that the latter, provided they are properly designed and controlled, need not necessarily spoil the environment.

The adverse effects which may result from any or all of these activities, if they are excessive or uncontrolled, are classified as follows:

1. Damage and disturbance, followed by deterioration of biological wealth, due to walking, trampling, digging, boating, fishing, hunting, shooting, collecting etc.
2. Degeneration through eutrophy or pollution, caused by all the various forms of litter, the use of soap, detergents, insecticides etc. and by exhaust fumes, oil, petrol and lead compounds (including of course the lead from shot).
3. Loss of natural areas, direct biotope loss, from the spread of buildings and many other constructions.
4. Imbalance, caused by the reduction or elimination of plant and animal species or by the introduction of new species.

Finally, in my paper I have listed a number of rules, the application of which would I suggest ensure the optimum use of wetlands. These are not purely theoretical but are based on many years of field experience in many countries. They may be summarised as follows:-

1. For every wetland area it is necessary as soon as possible to work out an organisational plan providing for multi-purpose use.
2. For this purpose and generally for drawing up the subsequent management policy, a basis of thorough scientific research is essential.
3. All forms of pollution must be detected, discharge of wastes being strictly prohibited and remedial measures being taken to prevent or reduce other kinds of pollution.
4. Development plans for recreational facilities should always include a study of their biological consequences.

DISCUSSION

One point concerning pollution has been of considerable importance in North America, namely the effect of agricultural fertilisers carried by run-off into waters. This can lead to the development of eutrophic

conditions, with consequential instability and deterioration of the habitat and a sharp reduction in the variety of plant and animal species. It is always essential to look at wetlands as a total balanced community of the species constituting or dependent on it, including of course man (Cragg).

Eutrophication can be a problem in many countries, but my impression is that in Turkey the majority of waters are already eutrophic so that pollution of a kind that tends to increase this is rather less important (Mörzer-Bruyns).

- (d) nutria farming as a method of increasing the economic return from wetlands and as a management technique.

Editorial Note

The inclusion of this specialised topic under this item of the agenda, arose from the fact that in the course of their investigations on neighbouring wetlands in Greece, the problems of which are in many cases rather similar to those found in wetlands due to be discussed at this Meeting, Mr. Ehrlich and Mr. Simotas had made the interesting suggestion that both from the development and management points of view the introduction of nutria Myocastor coypus can be beneficial. Accordingly they were invited to contribute a paper on the subject, although unfortunately neither of them was able to attend the Meeting in order to lead the discussion. Partly for this reason and also because of the very considerable experience of nutria farming in the U.S.A., Mr. John S. Gottschalk, head of the U.S. Bureau of Sport fisheries and Wildlife and a member of IUCN's Commission on Ecology, was invited and kindly agreed to contribute a second paper on the subject. The two papers are reproduced below followed by a summary of the points raised in discussion.

METHODS OF PROTECTING AND REPLENISHING STOCKS OF

WILDFOWL IN WETLAND AREAS

by

S. Ehrlich and A.G. Simotas

The observations on which this paper is based were carried out in Greece, some of them in the Evros Delta area near the Turkish frontier. The situation and problems encountered seem, however, sufficiently similar to those met with in many localities in countries further to the east to justify presenting them at this Meeting for consideration of their possible application.

Briefly, it was found that in the wetlands examined conditions unfavourable to wildfowl were being brought about by three types of change to the wetland habitats :

- (1) Vegetational succession.
- (2) Destruction of submerged vegetation by carp.
- (3) Drainage.

1. Vegetational Succession

The choking of a wide range of aquatic plants by reeds (Phragmites communis) and cat's-tails (Typha spp.) has been accelerated by flood control, diversion of water for irrigation and eutrophication by agricultural and domestic discharge. The development of large, uniform beds of these plants destroys the habitat of many aquatic birds.

2. Destruction of submerged vegetation by carp

On some lakes the conditions for the reproduction of carp are very favourable, whereas the food supply is scarce. This produces a stunted fish population without commercial value. This population grows, uncontrolled, until it destroys the submergent vegetation by constantly digging in the bottom. The destruction of submerged vegetation deprives duck of their food and makes them abandon some lakes completely.

3. Drainage

The extensive drainage of stretches of shallow water has deprived waterfowl of many sanctuaries and greatly reduced the area of others. The rapid expansion of drainage schemes has threatened virtually all coastal marshes and swamps and a large proportion of shallow lakes with destruction.

The Use of Nutria and Muskrat as a Protective and Preventive Measure.

Martin, Erickson and Steenis (1957) mention nutria and muskrat as the main biological means for the improvement of duck marshes by controlling the emergent vegetation and promoting the growth of plants on which duck can feed.

Waldo (1958) found that eat-outs produced by nutria in emergent vegetation attract duck. Ehrlich and Jedynak (1962) stocked a lake with nutria that was completely choked by a floating bog blanket. The extensive eat-outs attracted swans and other waterfowl. Cranes were regularly observed on the lake too.

The experience of Ehrlich over a number of years (1956, 1958, 1958 a, 1961, 1961 a, 1962, 1964, although effects on waterfowl were not described in the these papers) showed that intensive nutria-breeding, with shelters and feeding, will induce ducks to breed even on small ponds (the smallest was 25 ha. in area), and attracts a multitude of waterfowl and waders. Waders are attracted by the clearing of vegetation in shallow areas and the abundant food in the cleared shallows.

A blanket of duckweed (Lemna) develops on the surface of waters manured by nutria and together with its associated fauna provides a rich range of foodstuffs for waterfowl (Mesch, 1962). Many species also feed on grain provided for nutria.

The heaps of branches and reeds provided as nutria shelters are used by ducks to support their nests. The two species breed together in perfect harmony. Due to effective protection from hunting and predation the waterfowl become tame and this increases the value of such areas for educational purposes.

The economic return from intensive nutria breeding on ponds is a high production of nutria pelts and meat per area unit at a moderate cost. An important additional advantage is the increase in fish production by approximately 1 kg. per nutria, due to the destruction of emergent vegetation and manuring.

These economic effects make the ranching of nutria on wetlands more profitable than shooting. On low-lying seaside marshes, where the soil salinity reduces the yields of agricultural crops and constant pumping is necessary, nutria ranching is also more profitable than drainage and agricultural utilisation.

Nutria may therefore be used both as an alternative to drainage and for the prevention of unfavourable vegetation succession. Their ability to stimulate the growth of duckweed offsets the devastation of submerged vegetation by excessive carp populations.

Based on the foregoing considerations, the authors have made certain recommendations for dealing with the situation in Greece, some details of which are set out below.

1. Nutria farming as an alternative to drainage

The high maintenance costs of drainage systems and the low yields to be expected from low-lying, brackish coastal marshes make alternative utilisation projects worth considering. One alternative is the development of such areas as farms for breeding fish and nutria. The breeding of nutria on the marshes is in itself profitable. Combined with fish breeding it may give profits exceeding those from agricultural use, as

nutria greatly increase the yield of fish.

The authors studied a number of coastal lagoons for which drainage was planned or drainage works were already begun. In consequence the Peloponnesus Regional Development Service abandoned the drainage of the Agulinitza lakes (8,000 ha.) and Kaiafas (2,000 ha.) on the western coast of Peloponnesus, which were scheduled for draining. It was also decided to retain Lake Kerion (40 ha.) on Zante (Zakynthos) Island, where drainage works had already begun.

It is interesting to note that the local people also considered the retention of these lakes preferable to their being drained.

Other regional development services are studying the development of lakes for nutria breeding and fish culture as an alternative to drainage projects.

2. Nutria farming as a method of controlling the vegetation succession.

(a) The Agras Reservoir

This reservoir in western Macedonia was built 12 years ago as a storage reservoir for a hydroelectric plant. The area of the reservoir is 900 ha., its average depth is about 1-1.5 m., with extensive shallows. The reservoir has a peat bed and contains numerous peat islands.

Unfortunately the reservoir became choked by the rapid spread of a rank growth of reeds and cat's-tails. In May 1964 the reservoir was stocked with 60 nutria females, 25 males and 52 cubs. The animals reproduced rapidly and created numerous eat-outs in emergent vegetation, which were immediately replaced by submerged vegetation. Beds of duckweed developed in places where nutria colonies were concentrated. So far, however, only a large population of waterhens Gallinula has developed on the reservoir and other species of waterfowl appear only occasionally.

In September 1965 a new group of 87 nutria was released inshore and encouraged to keep together by being given food, in order to produce eat-outs in shallow water, and so improve conditions both for the development of fish fry and wading birds. Shelters were built for the nutria to keep them inshore over the winter. In spring the eat-outs will be planted with duckweed, considered as the best food plant for young waterfowl (Mesch, 1962)

Hunting and fishing have been prohibited along the shore stocked by the nutria colony. The protected zone occupies about a fourth of the total shore line and will be extended as the intensive nutria breeding area is enlarged. Funds have also been provided for stocking the reservoir with waterfowl with a view to creating a reserve.

(b) Lake Kalodiki

Lake Kalodiki in Epirus has been used recently as an irrigation reservoir. The area of the lake is 200 ha. and its depth fluctuates

from 1.5 - 3.0 m. The lake has been completely overgrown by reeds, cat's-tails and other emergent weeds. Only a few small open pools covered with water lily remain.

Stocking this lake with nutria is considered urgent and will be carried out within the next few months. Funds for stocking with waterfowl will also be provided if this is found to be necessary after the vegetation is cleared.

(c) The limnothalassa of Porto Lago

The limnothalassa of Porto Lago is situated on the southern coast of Thrace. The effect of sea water is to confine the growth of vegetation to the higher ground, where shallow water favours uniform stands of reeds. A plan to stock the reed beds with nutria has been accepted, so as to produce eat-outs in which floating or submerged vegetation will develop.

(d) The Evros River Delta

The part of the delta between the Maritsa (Meriç) and the main Evros river will be retained as a refuge. It has a varied vegetation supporting a rich avifauna. No immediate intervention is necessary.

However, the increasing diversion of the water into irrigation reservoirs is expected to decrease the spring floods. This will increase sedimentation in the water channels and produce stagnation in the smaller channels and pools. Sedimentation will in turn stimulate the spread of Phragmites. Stagnation will decrease the oxidation reduction potential in the mud which will result in submerged weeds being choked by cat's-tails (Typha).

It may therefore become necessary to control the spread of emergent vegetation. However it is assumed that many species of birds depend on emergent vegetation. The control of it should be just enough to maintain the balance between emergent and submerged vegetation. Muskrats seem to be better suited for this purpose, as their large dens limit population density and the impact on vegetation. Should they be insufficient to balance the plant community, nutria will be introduced in addition and maintained at a low level.

It seems unlikely that hunting could be effectively prevented throughout the delta area. It could be prohibited on one or more of the lakes of the delta if a dense, commercial colony of nutria were to be established there. But a nutria colony would destroy the emergent vegetation. We do not want to take such a drastic step until the studies of MAR specialists on the delta and on lakes stocked with nutria have made it possible to forecast the probable effect on the present bird population.

3. Nutria farming as a method of controlling destruction of submerged vegetation by carp.

The Stymfalia Lake in northern Peloponnesus has an area of 200 ha. and its depth varies from 3 m. in winter to 0.7 m. in summer. About half the lake is overgrown with reeds with some admixture of cat's-tails. The rest used to have a good growth of submerged vegetation and at one time the lake had a high duck population.

In the 'forties the lake was stocked with carp. By the early 'sixties the carp population had increased so much that the submerged vegetation was destroyed and the duck abandoned the lake.

Preparations have been made to stock the lake with nutria for the following purposes :

1. To produce eat-outs in reeds and cat's-tails, in which Lemna or submerged vegetation can again flourish.
2. To stimulate the individual growth of carp so as to enhance commercial exploitation of this fish and thus reduce its numbers.

It is also planned to stock the lake with trout with a view to controlling the carp fry. The possibility of stocking with wildfowl is envisaged.

Co-operation with the MAR Project

1. Studying the effects of nutria on the avifauna

The effect of nutria on vegetation and through it on wildfowl depends both on the average density and degree of concentration of the nutria population and on the features of the habitat. Studies by wildfowl specialists are needed to establish the best ways of using nutria on the lines suggested in this paper.

2. Re-stocking with waterfowl

As mentioned above, funds have been provided for stocking the wetlands with waterfowl, but cannot be used effectively without the expert guidance of MAR Project specialists. Guidance is needed on what species should be introduced, where stocks can be obtained and how best to establish, maintain and attract a good wildfowl population in areas where the wetland habitat has been improved.

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EXPERIENCE WITH NUTRIA IN THE UNITED STATES

contributed by

The Bureau of Sport Fisheries and Wildlife, Washington D.C.

Editorial Note:

In view of the recommendations made in the paper by S. Ehrlich and A.G. Simotas, involving the possible application of nutria farming to the improvement of wildfowl habitats, Mr. Gottschalk, a Member of IUCN's Ecology Commission and head of the U.S. Department of the Interior's bureau of Sport Fisheries and Wildlife, kindly arranged for a summary to be prepared of the Bureau's relevant experience. This was undertaken by Mr. C. Edward Garlson, Chief of the Division of Wildlife Research and is based largely on a report by Van T. Harris, Biologist to the Bureau.

Since the early introduction of nutrias into the United States, no intentional widescale introductions have been made. Small transplantings have been made into impoundments, usually in southern United States, to control aquatic vegetation. A few individuals have escaped or been released from small, privately-owned fur farms. Although feral nutria populations had developed in fifteen States by 1957, they have thrived and spread in only two regions, the northwest and the Gulf of Mexico coastal area. Only Louisiana, Oregon and Washington State currently produce more than 1,000 nutria pelts per season.

In Louisiana the nutria was at first heralded as a worthwhile addition to the fauna. In 1945-46 a nutria pelt brought an average of 5 dollars and the price held at 3 dollars or above for the rest of the decade. Despite enthusiastic trapping during this period, nutria populations in Louisiana continued to increase in numbers and distribution. In the 1950's the average price per pelt dropped as low as 1 dollar (1955-56) and interest in trapping nutrias waned. Although this price was still a little above that for a muskrat pelt, total income for a trapper was less because he could catch and prepare 10 to 20 muskrat pelts to one nutria pelt.

Although an attempt was made to promote the use of nutria fur in order to utilize the Louisiana resource, no great progress was made. The cost of processing nutria pelts and manufacturing fur garments in the United States places this fur in the luxury class where it cannot compete with seal, Persian lamb and mink. A limited market for the use of nutria carcasses as dog and cat and mink food has been developed in Louisiana to augment the price received by the fur trapper. Because of high production costs and low fur prices in the United States, ranching of nutria is not encouraged.

The nutria has little utility in the United States for wetland management. In Washington State it is believed to have competed with the muskrat, a more valuable fur animal. Wherever it has been established it has eliminated much of the marsh vegetation, particularly the larger emergent species. By thinning dense marsh growth in Louisiana it has improved some habitats for ducks and other wildlife (Bednarik, loc cit.). However, the difficulty in holding nutria populations at a proper level complicates its use in marsh management. 223

In southern States, particularly in Texas, enterprising individuals have sold wild-caught nutrias for vegetation control to improve fishing in impoundments and reservoirs. Control of emergent plants has been good, but control of excess underwater aquatics (also a nuisance to fishing) has been only mediocre. The net result has been an increase in the established range of the rodent and in crop depredations.

Nutria have caused damage in some impoundments in eastern Texas, where control of emergent vegetation was too complete. This allowed wind action to muddy the water, creating unfavourable habitat for submerged vegetation which the nutria did not attack. Nutria damage to rice fields adjoining the marsh probably first became known in Louisiana in the late 1940's. Damage to sugar cane, corn, and truck crops occurred about 1954, as the peak population developed in the marshes. Wherever nutria have been introduced, living close to human habitation, and even in their native land, damage to crops has been reported. Nutria cut down rice stems for food and to build platforms. They may wear paths over the field-control levees, weakening them so that a rainfall causes a break that drains sections of the field. Damage may occur to 10 per cent. or more of the crop in fields adjacent to the marsh. The damage diminished farther from the marshland.

Nutria are also found in burrows in levees of irrigation and drainage canals. Irrigation companies that serve the rice district inspect their levees twice a year and repack the burrows dug into them. In one instance, 100 nutria were reported killed while rebuilding half a mile of levee in Vermilion Parish. Biologists of the Bureau of Sport Fisheries and Wildlife counted 5 breaks caused by burrows in a ½ mile section of levee. Nutria burrows existed every 100 to 200 yards in another levee. Sugar cane fields damaged by nutria lie north of the marshes and swamps of south-eastern Louisiana. These areas are penetrated by nutria through a network of drainage canals. In St. Mary Parish, nutria invaded the fields when high populations built up in nearby marshlands. The hurricane of 1957 forced many nutria out of the marshes and greatly augmented the field populations. That summer, according to a newspaper account, 100,000 dollars worth of damage was caused by nutria in St. Mary Parish. Hurricane damage occurred, but estimates were not given. During the following winter, populations diminished so that 1958 populations and damage in the fields were light - on one plantation, with a trapping and hunting programme, one-twentieth of the proceeding year. On another plantation, where experimental control was applied late in the season, 20 of 560 acres were damaged, less than the 10 per cent. going estimate of the previous year.

Occasional damage occurs to a variety of other crops where cultivation lies close to nutria habitat. These include corn (maize), soy beans, winter oats, clover and truck crops, such as sweet potatoes and cabbage. In one instance, 234 hills of corn in a marsh garden were completely destroyed in two weeks. In the same garden, nutria dug sweet potatoes and destroyed two rows of artichokes. Nutria damage has contributed to the failure of cypress plantings in swamp areas of St. Mary Parish. Even ornamentals have been attacked. Banana trees have been cut down, amaryllis bulbs dug up, and bark chewed from ornamental and fruit trees. Bark chewing is probably always present to a limited extent, but increases greatly when food becomes very scarce for large populations.

During years following the hurricane of 1957 nutria damage to sugar cane again increased to an extent that the Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, was directed to begin a study of control methods in 1962. AS a result, zinc phosphide has been registered as a toxicant for nutria. Where drainage or irrigation ditches penetrate agricultural fields, this toxicant can be used selectively on floating platforms. This method, together with shooting, steel trapping and changes in habitat that make it unattractive to nutria, has provided excellent control of nutria damage.

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DISCUSSION

Experience with nutria in Britain has not been very encouraging. They were introduced in the 1920's under captive conditions, but many escaped or were let loose especially during the war years and established themselves widely in wetland areas. The damage they caused in the vicinity, especially to crops such as sugar beat, led the Ministry of Agriculture to start a campaign for their eradication. Despite much expenditure of money and manpower, it seems clear that total eradication may be impossible, although with the help of the very cold winter of 1962-63 a certain degree of control has been achieved. Nutria did have the effect of clearing some waterways, but as they also tended to reduce the variety of waterplants it is very doubtful if this could be regarded as beneficial. The conclusion is that the introduction of nutria should only be undertaken, if at all, with great care and circumspection in conditions where there is a guarantee that they can be prevented from spreading (Lea).

In Germany also it is only the very cold winters that successfully keep nutria under control. Marshland vegetation, especially phragmites, is as important as open water in maintaining a variety of species and a good natural balance, and in many wetlands it is already too scarce so that introduction of nutria would be a menace. This applies very much to the Meric delta area (Müller).

One of the drawbacks of nutria is that the animal is fond of using the nests of ground-nesting birds as resting-places and destroys them in the process (Olney).

In principle the introduction of fur-bearing animals is an obvious way of increasing the economic return from wetland areas and it should not be ruled out. It all depends on local conditions and at least in some places beneficial effects have resulted. The aim should be to apply the lessons of experience in order to avoid adverse effects and one principle might be to restrict introductions to isolated waters (Hoffmann).

Another principle which would seem advisable in the light of the American experience would be to avoid areas with adjacent rice paddies, again such as the Meric delta, because the damage done by nutria could be very great (Wilkinson).

Conditions for the introduction of nutria have been favourable in many parts of the U.S.S.R., where they have provided a useful supplementary crop and have been shown to be positively beneficial both for fish and wildfowl. Particularly good results are achieved where the animal can be kept in a state of semi-domestication (Isakov).

Probably the very cold winters in the U.S.S.R. are again the main factor in helping to keep nutria under satisfactory control. In milder climates the use of herbicides to reduce excessive vegetation would seem to be a better answer: the use of dalopon for this purpose in Britain costs about £10 (\$ 24 or T.L. 220) an acre in material, to which must be added the cost of labour, but this is probably cheaper than the cost of controlling nutria (Lea).

It is a question of weighing the economic benefits to be gained from nutria farming against the possible harm to the conservation of other species, so that if a higher return can be obtained from nutria, which is getting very scarce in many parts of Europe, full weight must be given to this fact and introductions of the animal may well be justified (Hue).

Account must also be taken of the fact that fashions and so the value of furs can change very very rapidly, so that animals which are introduced for good economic reasons can become a liability rather than an asset, also from a strictly economic point of view (de Vos).

As well as changes in fashion, improvements in imitation or synthetic substitutes have also had a great deal to do with the decline in value of nutria in many parts of Britain and America (Cragg).

A detailed study of the results of introductions of fur-bearing animals into the U.S.S.R. was contributed to IUCN's 10th Technical Meeting at Lucerne by Dr. N.F. Lavrov and Dr. V.S. Pokrovsky. It is published in IUCN Publications new series No. 9 and several other papers in this volume are very relevant to this discussion (Elliott).

The only possible conclusion to be reached for the present is that the benefits to be obtained from introducing an animal like nutria are so problematical that they must be looked at with extreme care. It is not even enough to rely on a study of the animal in its original environment, because for example the habits of the north American muskrat Ondatra zibethica changed completely when it was introduced into Europe. Even if full information can be obtained one must be prepared for surprises (de Vos).

FIFTH TECHNICAL SESSION

Thursday 12 October 1967 : Ankara

Agenda Item 5 : research, management and legislative needs
and opportunities

Five papers formed the basis of discussion of this item of the agenda. The first was contributed by the doyen of Indian ornithologists, Dr. Salim All, although unable himself to attend the Meeting. Dr. Salim All's knowledge and experience of the birds of southern Asia and his particular interest in wetlands and wildfowl, made his contribution a particularly welcome one. His paper covers certain aspects of all three sub-headings - research, management and legislation - and, although based on observations in an area neighbouring but beyond the borders of the Middle East, raises issues which are equally relevant within this Region.

The second paper by Mr. C.D.W. Savage reviews the need for wildfowl sanctuaries, refuges and reserves in the south-west Asian context and, in particular, the extent to which this need is met by 'effective reserves' or areas which are reserves in effect though they may lack formal status. He also examines some management requirements for improving such effective refuges and the type of research on which a reservation programme should be based.

Papers by Mr. Eskandar Firouz, on the Mordab of Pahlavi in Iran, and by Mr. Günther Müller on the Meriç-Evros delta on the Turkish-Greek frontier were placed under this item of the agenda because, although including full descriptions of these two highly important areas together with an up to date assessment of their conservation status, they pay particular attention to the measures of control and management which are being or should be applied.

The fifth and last paper, by Dr. L. Hoffmann, reviews progress of the IWRB study of existing legislation governing the exploitation of wildfowl resources, since it was extended to south-west Asia and analyses the results so far achieved.

Finally, opportunity may perhaps be taken in this introduction of mentioning an additional paper, kindly made available by FAO and very relevant to the 'management' sub-head of this item of the agenda. Unfortunately, due to postal delays, it was received too late to be tabled at the Meeting. This was the U.N. Development Program (FAO) Report No. TA 2391 (1967), submitted to the Turkish Government on the subject of Wildlife Management. Although the authors, Mr. Lloyd W. Swift and Dr. C.W. Holloway (the latter now Secretary of IUCN's Survival Service Commission) were, respectively, chiefly concerned with organizational problems and with the conservation of Turkey's large mammals, the report reaches conclusions and makes many recommendations which are equally applicable to the wetland and wildfowl

situation. Attention may perhaps be specially drawn to the emphasis on 'sustained yield' as the basic economic objective and on education and training, of skilled scientific and warden staff and also of public opinion, as a basic requirement for achieving effective conservation.

In accordance with the Chairman's ruling, the discussion which followed this group of papers, after disposing of one or two specific points raised in Or. Hoffman's review of legislation, took up two main themes: the general approach to and research required for achieving wetland conservation; and the particular requirements for implementing Project MAR in the Region. Both themes were of course related to the agenda as a whole, but for convenience the points made in the discussions are summarised at the end of this section and conclude the account of the technical sessions.

SOME PROBLEMS OF ASSESSING WILDFOWL NUMBERS AND

MAINTAINING WILDFOWL HABITAT AND STOCKS

by

Dr. Salim Ali

Many of the problems discussed in this paper, based on observations in India, are probably found to a greater or lesser extent in the countries with which this Technical Meeting has been concerned and, particularly, in areas affected by seasonal or 'monsoon' rains. I hope therefore that what I have to say may be helpful not only in identifying some of the problems but also in suggesting some solutions which may have fairly widespread application.

In a country like India where many of the jheels (usually rain-filled natural depressions) that attract migratory wildfowl in the winter months are of an ephemeral nature and closely dependent on the monsoon, subjective estimates of abundance or scarcity of birds from year to year provided by casual sportsmen are apt to be misleading. The vagaries of the monsoon are notorious: they fluctuate between complete failure one year, bringing drought and famine, to floods the next, devastating hundreds of square miles, washing away crops and causing untold damage in other ways. Between these two extremes, wetlands and duck populations also keep fluctuating. In a year of drought most of the smaller jheels in the affected areas dry up and the larger ones become attenuated to a fraction of their size. In years of rainfall-excess (which may immediately follow the drought), when the flood waters recede they leave behind a vast number of small jheels dotted over extensive tracts of country.

Both these conditions affect migratory wildfowl in very different ways and create different impressions of the position on different observers. To one local observer a drought year may seem a bumper year for duck simply because they have concentrated in his area where more water happens to be available. This gives the impression of unusual abundance which, for the country as a whole, may be unwarranted and even false. On the other hand in a year of floods, when the birds are probably equally abundant in the area as a whole, the same observer may generalise that there are fewer ducks than last year, an equally false impression simply due to the birds having spread out more widely.

Many sophisticated 'sportsmen' in India today are hardly capable of distinguishing between a duck and a coot, leave alone identifying individual species - say a pintail from a gadwall -, but neither do they care. It is really the meat they are after, and quantity rather than quality. A proportion of hunters, moreover, are people who have previously never handled a gun in their lives, but having reached a position of some consequence feel it the proper thing to acquire a gun and masquerade as sportsmen. Such persons - and their ranks are unfortunately swelling - ignore 'trivialities' like ethics of sport, close seasons or protected species. They prefer shooting from jeeps and getting the maximum return by 'browning' a sitting flock. This has happened and is happening in India, despite statutory total

protection, for example in the case of the magnificent Great Indian Bustard (*Choriotis nigriceps*).

What I wish to emphasise is that to my mind in countries where academic (as opposed to purely gastronomic) interest in waterfowl and competence in their field identification is lacking among sportsmen, it is idle to expect even a remotely correct estimate of wildfowl numbers from this source. The problem of arriving at valid conclusions about the wildfowl situation is therefore made more difficult for two main reasons :

1. Instability of wetland areas frequented by wildfowl due to vagaries of the monsoon, quite apart from the effects of rapid agricultural and industrial developments such as those taking place in India and other Asian countries;
2. Lack of knowledgeable resident birdwatchers who alone can furnish reliable comparative data., for the more stable wildfowl areas over a sufficiently protracted period, for an assessment of the overall position.

This means that immediate measures for greater protection of wildfowl can often only be taken, and must be taken, on the basis of an assumption that the situation is likely to be deteriorating, taking account of the phenomenal increase in population everywhere and the opening up of extensive tracts for agriculture and new industries, with consequent deprivation of suitable habitats for the birds.

One area which I have been closely studying for many years is the Bharatpur area in Rajasthan, which contains the remarkable Keoladeo Ghana Waterbird Sanctuary. The jheel, covering over 7,000 acres, was a duck-shooting preserve of the erstwhile rulers of Bharatpur State, where the bags made at some big shoots - over 4,000 birds per day to 40 or 50 guns - are indicative of the magnitude of the concentration of wildfowl here in years of normal monsoon, especially when it is taken into account that perhaps half as many birds again must have been killed and never picked up or have got away wounded. Yet in monsoon-deficient years the wetland is practically dry with a few muddy puddles here and there in the deeper depressions. It would be impossible for one unacquainted with the jheel in a normal year to conceive of the enormous potential concentrations of duck and geese.

The Keoladeo Ghana is largely a low-lying inundated jungle of *Acacia arabica* and similar trees, interspersed with more open reedy patches of shallow water where migratory waterfowl collect during the winter months. I have frequently attempted with the collaboration of a number of fairly competent birdwatchers, to obtain even a rough and ready census of the birds and consistently failed. Our various estimates were so divergent that no reliance on them seemed justified. This was so even with the overall population, without any attempt at specific counts. Visual estimation is, I fear, impracticable and unconvincing on jheels of the Bharatpur type, which is certainly the best sort of wetland for wildfowl we have in India.

Old-timers are apt to grumble that migratory ducks are far fewer now than say 30 or even 20 years ago. I can now claim to be an old-timer myself and also very keen on shooting, but objectively I cannot assert with confidence, though past recollections are always rosier, that

birds are in fact obviously fewer today than I have known them in the past. So although there has probably been a real decrease in the case of certain areas of altered ecology due to the processes of development, the comparative overall position in the country as a whole is difficult to gauge.

My general feeling is that in India, under the existing restrictions on the import of guns and sporting ammunition and the scarcity and high cost of locally manufactured substitutes, aided by efforts to limit or ban commercial netting and trapping, the direct pressure on wildfowl numbers has certainly lightened, and it would ease much more if poaching could be effectively stopped. A proposal to limit sportsmen's bags of wildfowl is under consideration by such of the Indian States as require a shooting licence for game in addition to one for the possession of arms. The pity is that Administrations are seldom earnest enough about the control of poaching. We have as yet no department of government specifically charged with the overall responsibility for protection of wildlife, so that in spite of excellent and comprehensive legislation in most of the States, poaching continues to flourish.

However, I feel that what may prove a far greater threat to wildfowl in India than all the others put together, is the rapid disappearance of the wetlands that have so far provided the birds with comparatively undisturbed refuges. Drainage and reclamation for cultivation and industrial purposes, without any consideration for maintaining or creating some reserved areas, has happened on a large scale, for instance in the Gangetic Plain in Bihar, which was full of marshes and jheels or chaurs till the 'twenties of the present century, and once the home of the recently extinct Pinkheaded Buck (Rhodonessa caryophyllacea). Under pressure of our exploding population, aggravated by the problem of rehabilitating refugees and repatriates, drainage has been spreading apace even to remote tracts during recent years.

However, the disappearance of wetlands is not due entirely to active encroachment under these pressures, but also to a considerable extent to neglect. In the last several years, for instance, the menace of the Water Hyacinth (Eichhornia) to the Keoladeo Waterbird Sanctuary in Bharatpur has been growing at an alarming rate. About 8 years ago, under sustained pressure on the Rajasthan Government from certain scientific bodies and interested individuals, the jheels were successfully cleared of this plant pest at great public expense by means of specific herbicides. But little care was taken thereafter to keep the pest under control, with the result that it has now raised its ugly head again with redoubled virulence and choked up extensive areas, rendering them unsuitable for wildfowl. The longer this state of affairs is allowed to drift, the more difficult will become the eradication of the weed and the more costly the operation. The more costly the operation, the less willing or able will be the State government (With its limited financial resources) to tackle the problem.

To sum up, with material developments on the scale and at the speed at which they are taking place in India today and many other Asian

countries, I am convinced that the only hope for wildfowl lies in the establishment of at least one or two - more if possible - sizeable wetland reserves in every State, province or region, but scientifically managed and administered as National Parks under the authority of the Central Government. Only thus will they be assured of a reasonable hope of permanency and immunity from local politics and from local shortage of funds for dealing with such problems as that of Eichhornia. In many Indian States and probably in other countries too, a reservations policy can be achieved without much difficulty or extra expenditure if imaginatively linked with great projects of dams and wetland management, which are being established for development, always provided they are planned on a proper multi-purpose basis.

WILDFOWL REFUGES IN ASIA AND THE NEAR EAST

- by -

C.D.W. Savage

Summary

Natural or 'effective' refuges play an important part in the distribution and regulation of wildfowl populations in Asia as a whole and the Near East in particular. The majority of these refuges are however vulnerable to disturbance or development in the very near future and it is important to understand and take account of the reasons for this, if the effects of such disturbance or development are to be mitigated. The essential conditions and definition of an 'effective' refuge are considered in an Asiatic context and suggestions are made for future research and investigation.

Introduction

In contrast with Europe, many of the important wetlands of Asia are still remote or hard of access while most of the remainder are not only subject to increasing human disturbance but are obvious targets for drainage, reclamation or other forms of development. Few such wetlands are protected by law, yet natural or 'effective' refuges may well determine both distribution and status of wildfowl populations throughout Asia. The type of food supplies, abundance and seasonal occurrence no doubt determines the species which can benefit from these refuges, but the limiting factor is undoubtedly the degree of freedom from disturbance.

Some of these natural or 'effective' refuges may be regarded as secure for reasons of topography, remoteness or proprietary (or legal) protection. Obvious examples are some of the lakes of Tibet, Himalayan cirque lakes and the huge proprietary shooting preserves of Sind in West Pakistan. Such refuges are of immense benefit at different times of year and for different reasons, and undoubtedly stabilise regional wildfowl distribution. The Tibetan lakes provide refuges for all but two months in the year when they are frozen over and serve to reduce the period of high hunting pressure for a significant (but as yet unassessed) proportion of the wintering wildfowl population of India and East Pakistan. The cirque lakes of the western Himalayas on the other hand provide easy staging points for the autumn broad-front migration over some of the most forbidding terrain encountered by wildfowl anywhere.

Other wetlands, if not most, are already subject to disturbance to varying degrees and the 'effective' refuge may be a fraction of the potential. All these wetlands must be regarded as insecure since they are vulnerable to pressures of human activity in some form or other. Typical examples are the Mordab of Bandar Pahlavi in northern Iran (vulnerable to the varying water levels of the Caspian Sea), the lakes of the Nil. Delta (vulnerable to drainage and agricultural development), most of the marshes of Iraq and the jheels of the Punjab

and northern India (vulnerable to changes in water use and flood control measures).

A third category is the seasonal or occasional wetland. This is characteristic of the arid zones of the world where far greater variations in rainfall occur than in the temperate zones. Several are hundreds of square kilometers in extent. Some are effective only perhaps one in ten years, but by reducing overall hunting pressure they may have an important function in regeneration of stocks. A notable example is the Hamun-e Lora in Baluchistan. Important characteristics of all seasonal wetlands are the rich food potential and open, safe, conditions.

Conditions for a Refuge

A wildfowl refuge in the present context requires two attributes, freedom for wildfowl to rest without undue disturbance and readily available food supplies, either at the resting place or nearby. The main attribute however is freedom from undue disturbance.

In practice most refuges are liable to disturbance around their perimeters and thus the effective refuge is nearly always less than the potential refuge. The efficiency of the refuge can therefore be usually improved by control of disturbance (i.e. conservation) or by elimination of disturbance (i.e. protection). By drawing this distinction it is possible to assess the broad picture without giving too much weight to insecure wetlands which are here today and perhaps gone tomorrow.

In practice the effective refuge normally falls into one of the following categories:

1. Open Lake

- (a) if no shooting or fishing; anything over 250 ha.
- (b) if shore shooting practised; as (a) but excluding the area within 800 m. of the shore.
- (c) if boat used for fishing; as (a) but excluding 100 ha. per boat.
- (d) if shooting from boats; as (a) but excluding 25 square kilometres per rowing boat or 125 square kilometres per motor boat.

2. Reedy Lakes and Marshes

- (a) if no shooting or disturbance; anything over 100 ha. sometimes less.
- (b) if shooting allowed nothing less than 15 square kilometres is viable, i.e. of significant value.
- (c) if shooting is limited to one day in twenty, or guns severely restricted and shooting allowed not more than two days a week, the viable effective refuge will be intermediate between (a) and (b), but the efficiency of the refuge will depend largely on how the shooting is managed.

The above categorisation assumes that wildfowl use the wetland. This can only be determined by observation, but some extrapolation can be done from map studies on the basis of ecological similarity with known areas.

There are very few wildfowl refuges in Asia of the kind known in Europe where shooting is strictly regulated, and this category is only considered briefly under 2(c) above where the degree of disturbance has a very significant bearing on the efficiency of the refuge.

Sanctuaries

Wildlife sanctuaries have an important part to play in many fields of wildlife conservation, but in the writer's opinion, wildfowl sanctuaries should be created sparingly and only for the following reasons:

- 1) where required for education or research; e.g. in public parks, at ringing stations or observatories.
- 2) to safeguard a specific species; e.g. the Whiteheaded duck Oxyura leucocephala at Khabbaki Lake in West Pakistan.
- 3) to provide a refuge where this cannot be provided by any other means; e.g. too small an area available.

A wildfowl refuge network for Asia and the Middle East

The first stage in conservation of wetlands in Asia and the Middle East is clearly the establishment of an agreed MAR list of wetlands of international importance. These wetlands or wetland groups often cover large areas and it would be impractical to consider conservation of the whole of such areas and the object must be to safeguard adequate effective refuges in these areas to maintain the present character and composition of wildfowl populations using them. As discussed earlier the effective refuge is usually less than the potential refuge and thus by conservation and management of part of the wetland complex it should in most cases be possible to maintain if not improve on the status quo.

The second stage is to assess the function of existing effective refuges in each region to determine the national or regional requirements to maintain distribution and status of wildfowl stocks. In many oases the situation will for a time only need surveillance, but development projects or improvements in communications will often require active protection of wetlands from time to time.

In the second stage, multi-purpose use of wetlands is likely to require increasing attention, also the improvement of permanent swamps such as canal seepages and barrage headponds, fish tanks and shallow reservoirs. Management of all types of wetlands by trained personnel moreover is as important as policing. Parallel land usage for grazing, buffalo wallows, reed cutting, fishing and even clothes-washing and bathing has its place beside intelligent cropping of the wildfowl resource. Indeed irrigation and reclamation projects are required all over Asia and the Middle East for proper use of natural resources of land, water and population. Conflicts of interest are bound to occur but the solution, as so often, is to be found in co-ordination of different disciplines and planning in the knowledge of facts procured by painstaking systematic observation and research.

Research required

Extension and adaptation of Project MAR to Asia and the Middle East

requires a concerted research effort in the following directions:

- 1) Descriptive investigation of all important wetlands, not only for production of the MAR List but for classification and understanding of all types of wetlands.
- 2) Investigation of wetland use (by wildfowl and other animals) - most immediately, extension of the International Wildfowl Census and the making of monthly counts.
- 3) Assessment of the effects of different kinds of development projects on wetlands - particularly the hydrological aspects - and a survey of such projects under construction or projected.
- 4) Basic research by Universities or research institutes on the ecology of wetlands, with particular reference to productivity, the effects of seasonal and annual changes in water level, temperature and water quality, as well as of land use and management practices.
- 5) A basic study of climate and hydrology on a continental scale with particular reference to regional differentials in rainfall, run-off, and evaporation, and frequency distribution thereof.

It is perhaps early to consider management of wildfowl in Asia and the Middle East on the basis of computer analyses of population dynamics, but such is the rate of change in the world today that systematic conservation of wildfowl can no longer be delayed. Whatever methods are employed, the basis parameters have to be isolated and it is with this in view that the present suggestions have been formulated.

THE MORDAB OF PAHLAVI

- by -

Eskandar Firouz

At the south-west corner of the Caspian Sea lies a narrow coastal plain produced by a general retreat of the sea, which at one time probably extended as far as the foot of the Elburz Mountains. Numerous rivers originate in the northern foothills of this range, but they are all short and cover small distances before they reach the sea. Some of these rivers, in the vicinity of the port and city of Pahlavi, flowed into a rather large lagoon which has gradually become a freshwater lake due to the lowering of the level of the Caspian. This lake is now known as the "Mordab" and is an important wintering area for many palae-arctic waterfowl species.

Description

The Mordab is rather long and narrow, running approximately north-west south-east and roughly parallel to the Caspian coastline from which it is separated by a narrow strip of land varying from a few hundred metres up to a half kilometre. It is about 30 km. long and about 4 - 8 km. wide. Of the 200 sq. km. or so total area, only about 15% is open water. The greater part is covered by Phragmites reeds and various shallow-water aquatics. The water is quite clear and very shallow with a maximum depth of probably only 1½ metres. Many species of underwater plants flourish and in places, cover the surface of the water.

The surrounding plain is quite level and the land immediately adjacent to the Mordab stays wet almost all year round. Any fluctuation in the level of the Caspian, of which there have been many in the past, drastically affects the level of the Mordab. The size of the Mordab has decreased since 1930, but has remained relatively stable in the last few years.

Uses

The Caspian coastal plain and in particular the land around the Mordab is extremely fertile and as more and more people come into the area the remaining forest is being cut and new lands are cleared for agricultural use. The climate and abundance of water makes for ideal conditions for the production of rice. Some tea and row-crop vegetables are also grown. The Mordab and the deeper rivers flowing into it are used for transportation of farm goods as well as people and other materials to the various villages and to the larger city of Pahlavi which is located on the north-east end of the Mordab. Parts of the Phragmites marsh and the open wetlands unsuitable for agriculture bordering the south side of the Mordab are heavily utilised by domestic livestock for grazing. Some of the other areas are also grazed, but to a lesser degree. Several villages cut and use the reeds for mats, fences and building materials.

Fishing plays an important role in the area, as the Mordab is the principal breeding ground in the area for the so-called Whitefish (*Rutilus frisii kutum*) and, to a lesser extent, of the local Sander (*Lucioperca lucioperca*). The Pike (*Esox lucius*) is also abundant.

By far the most important value of the Mordab and surrounding wetland areas is as a waterfowl habitat. All year round there is a large population of Waders, Rails, Coots, Snipe, Grebes, Raptors and Passerines. In the Fall, starting in early September and sometimes in late August, great numbers of ducks begin arriving to spend the winter months. A little later Geese and sometimes Swans follow. The area is extremely rich in food sources for all these species of wildfowl, which use the open water of the Mordab, the surrounding rice paddies, the thick marsh vegetation and the adjacent Caspian.

From the first days of Autumn when the wildfowl begin arriving until they leave in late March and early April of the following year, a large portion of the human population of the area turn their efforts to the hunting of these birds. This is accomplished in two ways. One is by shooting and the other is by the traditional "net, gong and flare" method. The net method can only be accomplished under certain weather conditions and at night, while the shooting goes on all day.

The everyday use of the Mordab by the boatmen and fishermen considerably disturbs the wildfowl, to say nothing of the effect the hunters have. Many ducks fly out onto the Caspian to spend the daylight hours, only coming into the Mordab in the evenings to feed, others hide in the reed beds while still others move back and forth on the large open sheet of water of the Mordab. Once darkness comes, the birds are able to rest. The method of netting the ducks at night is all done very quietly and efficiently and causes virtually no disturbance.

Protection and Conservation

The Iran Game and Fish Department has a provincial office in Pahlavi to keep a close watch on the Mordab. In the past when there were no laws governing the hunting of waterfowl, many different types of nets and hunting practices went on that were quite efficient in capturing wildfowl but, if left unchecked, would have resulted in serious depredation of the wildfowl population. The need for a conservation management programme was felt by only a few individuals. With the advent of the Game Council in 1956 and their laws to control hunting and fishing, strict regulations governing the taking of wildfowl were laid down. Many of the Mordab residents were reluctant to observe these laws since they felt it was their right to hunt whatever and however they felt inclined. Thus, some illegal hunting and trapping methods still continue despite the efforts of the Game and Fish Department and the local Gendarmerie. But on the whole, the wildfowling industry is fairly closely controlled. Evidently education with a view to developing public appreciation for the importance of such conservation measures remains a significant facet of the Department's aims.

Nevertheless, with the rise in the human population and the consequent decrease in the wetland habitat, pressure continues to increase on the wildfowl population. In an effort to relieve some of this pressure, the Game and fish Department has set aside 8,000 hectares of important reedbed and marshland on the south side of the Mordab as a Refuge. Hunting, fishing, reed cutting and other activities will be prohibited or carefully controlled to allow for maximum security and protection for all species of plants and animals in the area, with special emphasis on the wildfowl. As this will be the first year of operation of the refuge it will be interesting to observe and analyse the results.

The Refuge will serve as an important wildfowl habitat and provide a good study area to carry on the Department's ringing programme.

A MANAGEMENT PLAN FOR THE MERIC DELTA

by

Günther Müller

Since the end of the Second World War the Meriç (Evros) Delta, on the frontier between Turkey and Greece, has lost a good deal of its original character due to the intensive effort which has been put into agricultural development projects. In particular its birdlife has suffered from the spread of cultivation and also from increasing hunting pressure, although it still remains extremely impressive.

At the present critical stage in this process, it has been suggested by IUCN and the other sponsors of the 'MAR Project' for the conservation of wetlands that part of the delta certainly rates for inclusion in the category of "wetlands of international importance" and should be protected accordingly. Although the comprehensive ecological investigations which would be desirable as a basis for the selection of such a reserved area have not yet been completed, there is already sufficient knowledge, especially in regard to the quantity and quality of the avifauna, to justify the presentation in this Paper of a preliminary plan, which can be modified later if additional information makes this necessary.

A. History of Ornithological Research in the Area

Surprisingly enough the first published observations on the birds of the delta appear to have been those of Harrison and Pateff in 1937. It was not until 1955 that Flach began the series of short visits by ornithologists which became more frequent from 1960 onwards. A noteworthy fact in this connection is that all these visits took place either in winter (including five which were sponsored by I.W.R.B.) or in early spring and summer. As a consequence there is a distinct lack of data on the autumn migration period.

Many of the results of these observations have not yet been published and it must also be emphasized that most observers have concentrated their attention on the Greek side of the delta. In the Turkish sector, so far as I know, including the Gala Gölü, the breeding season has only been covered by the visits of Kussmaul and myself in 1966 and 1967 (results still to be published). A detailed report on the avifauna based on all the information available and covering the whole delta region, is however now in the course of preparation.

B. General Conclusions of Ornithological Research to Date

The great ornithological importance of the Meriç delta can be most easily appreciated by comparing the number of species which have been recorded there with the species-lists of Asia Minor and Greece :-

Asia Minor : 366 species (according to the critical review carried out by Kümerloewe, 1961). Greece : 376 species (according to the list prepared by Bauer, Helversen and Hodge). Meriç/Evros : 294 species.

The astonishing richness of the Meriç avifauna can be even more clearly demonstrated by the following analysis of the status of the most important groups of birds :-

I. Anseriformes

27 of the 38 species of southern and western Europe have been recorded :

Breeding species : eight, including -
Anser anser : only breeding place in Greece and one of the very few proved breeding places in Turkey.
Tadorna tadorna : hitherto only recorded (Kümerloeve 1964) as nesting at the Burdur Gölü in Turkey.
Aythya nyroca : the most plentiful breeding duck of the delta.

Wintering population :

As a result of the five IWRB investigations previously mentioned, the number of wintering duck has been estimated at between 100,000 and 125,000, and may well be considerably higher in a severe winter. The main species involved are :-

<u>Anas crecca</u>	:	30%	
<u>Anas acuta</u>	:	20%	
<u>Anas penelope</u>	:	10%	
<u>Anser albifrons</u> and. <u>A. anser</u>	:	20%	(25,000 were recorded in 1965/66)
	:		

Every year about 40 to 60 Branta ruficollis occur, this being their only regular wintering-place outside the USSR. Due to the lack of observations in March and October there is very little data on Anas querquedula, which according to reports by wildfowlers must be very numerous on passage. The delta is not an important wintering area for diving ducks.

On the basis of these figures there is no question but that the Meriç delta compares in importance as a wintering area for the Anatidae with the Camargue, the delta of the Danube and the mouth of the Menderes river.

II. Pelecaniformes, Ciconiiformes, Gruiformes

Breeding species : Up to 1962, some 30 to 40 pairs of Pelecanus crispus were recorded (Nisbet, Zelenka, Güttner).

There are still two large heronries in the delta, one in Turkey and one in Greece, and a cormorant colony which is in the Turkish sector. This is also the only nesting-place in Greece of Egretta garzetta and Plegadis falcinellus, except for the delta of the Louros in the extreme west of the country. Counts undertaken in 1967 gave a total of about 2200 breeding pairs, made up of :-

<u>Nycticorax nycticorax</u>	:	600 - 700	breeding pairs
<u>Ardeola ralloides</u>	:	450 - 500	" "
<u>Egretta garzetta</u>	:	250 - 300	" "
<u>Plegadis falcinellus</u>	:	500 - 600	" "
<u>Phalacrocorax carbo</u>	:	80 - 100	" "
<u>Phalacrocorax pygmaeus</u>	:	90 - 100	" "

No accurate counts have yet been made of the numbers of the more generally distributed breeding herons, Ardea cinerea, A. purpurea and Ixobrychus minutus. The spoonbill Platalea leucorodia population was estimated at about 40 pairs in 1964. Cranes Grus grus were probably once well-established, but have nowadays become an irregular breeding species, only one nesting pair being recorded in 1965. The three or four pairs of black storks Ciconia nigra nesting in the vicinity of the delta constitute the only proved breeding population of this species in Greece.

Passage and wintering population :

Up to 600 pelicans have been recorded outside the breeding season (Raines 1962). The delta is also most important as a wintering area for Casmerodius albus (300 recorded in 1965/66), and also as a stopping-place on migration for the south-east European population of Plegadis falcinellus and Ardeola ralloides.

III. Waders

Some 40 out of the 43 species which could be expected to occur in western and southern Europe have been recorded.

Breeding species : 10, including :-

Himantopus himantopus : the 450 - 500 pairs nesting in the delta constitute the biggest concentration in south-east Europe and Turkey. The population of Recurvirostra avosetta is also estimated at 400 - 500 pairs and there is a somewhat unreliable breeding stock of 25 - 50 pairs of spur-winged plover Hoplopterus spinosus.

Migrants : numerical data are lacking, especially for the autumn passage.

Winter visitors : the delta is a notable wintering-place for avocets Recurvirostra avosetta, of which as many as 4,000 have been recorded, probably representing a very large part of the entire Balkan population.

IV. Laridae

Nineteen of the 21 possible western and southern European species have been recorded,

Breeding species : 6, including :-

Chlidonias hybrida : the large breeding colonies constitute the only examples in Greece, except for a small colony on Lake Nitrikoy, and similarly in Turkey, except for the Amik Gölü and Apolyont Gölü colonies.

Chlidonias niger : Few nest elsewhere in Turkey or Greece.

Gelochelidon nilotica : several colonies in the delta.

Winter visitors : an important wintering place for Larus melanocephalus and Larus genei.

V. Falconiformes.

Of the 38 species occurring in western and southern Europe, no

less than 33 have been recorded in the delta and the hills of its immediate neighbourhood.

Breeding species : 22, of which 10 nest in the delta itself, including :-

Haliaetus albicilla : the fifteen pairs nesting in the delta constitute a concentration which is unique in the whole of Europe.

Aegypius monachus : the same applies to this species which is also represented by about 15 pairs in the mountains of the Greek sector.

Other breeding species, elsewhere very thinly distributed in Europe include Gypaetus barbatus, Aquila pomarina and Hieraetus fasciatus.

C. Threats to the Habitat from Water Development and Farming.

These include :-

1) The Evros-Meriç Project, a joint Turko-Greek programme for the development of the valley which is being undertaken under MATO auspices and German co-ordination.

The preliminary reports on the project indicate that the irrigation area between Alexandroupolis and Edirne is to be enlarged from 20,000 to 140,000 hectares, water for the purpose being mainly drawn from the river itself. It is not yet possible to judge what will be the effect on the water regime further downstream or consequential changes in the biotopes.

2) Existing agricultural activity. On the Turkish side almost the whole available area south of the main Meriç dam is already being used for rice-farming, but on the Greek side the area between the Evros main dam and the railway is still in the process of being brought under cultivation. Again there is not yet sufficient information available about the plans, to make a reliable prognosis of the likely effects, but the wintering-grounds favoured by Anatidae, and especially the geese, are obviously already under threat.

3) Three more specific dangers :-

(a) The felling of trees along the main course of the rivers, if continued as at present, could soon lead to the elimination of the characteristic plant communities. It tends to be quite uncontrolled and does not, for instance, spare the trees used for nesting by the unique concentration of sea-eagles Haliaetus albicilla.

(b) Grazing of domestic stock in the area favoured by gulls, terns and waders for breeding is on the increase and very considerable damage has already been done to the nesting-sites of these colonial species.

(c) The custom of keeping domestic pigs on islands in the rivers during the bird breeding-season has caused serious losses to the heron colonies.

D. Excessive Hunting Pressure on Wintering Wildfowl

Although this is an important factor in the decline of wildfowl stocks, it falls rather outside the scope of the present paper.

E. Measures Recommended for the Protection of Wildlife Resources and the Implementation of a Management Plan for that Purpose.

1. The recommendations are shown in the attached sketch-map and include :-

- (a) The urgent establishment by the Government of two nature reserves, about 110 square kilometres in extent, covering :-
 - i) A strip along the main course of the river, between the river dams from Karpuzlu and Poros downstream to the river mouth, and thence northwards for about 5 km. along the coast and including the small off-shore islands. About 26 sq. km. of the reserved areas would be in Turkey and 55 sq. km. in Greece.
 - ii) The water surface and shores of the Gala Gölü and of the other small lakes to the north-east up to and including the Sigirca Gölü. The total area, all of it on Turkish territory, would be about 27 sq.km.
- (b) The establishment of waterfowl refuge areas, which would be the only areas in which shooting would not be allowed, totalling some 75 sq. km. and comprising :-
 - i) About 40 sq. km. on Turkish soil, lying between the main Meric dam and the Gala Gölü and including the whole of that lake.
 - ii) About 35 sq. km. on Greek soil around the mouth of the Little Meriç and the off-shore islets and extending up to about 6 km. inland.

2. For the purpose of making these recommendations effective the following rules and regulations are suggested for the three areas shown on the map as Nature Reserves or 'Sanctuaries'.

- (a) There should be no extension of cultivation into the Reserves.
- (b) In the parts of the Reserves used for nesting by ducks, gulls, terns and waders, grazing of domestic cattle should not be allowed during the breeding-season of 15 April to 30 June and, likewise, the custom of putting pigs out on the islands in the river on which the heronries are situated (marked H on the map), would be suspended during this period.
- (c) Bird-shooting in the Reserve areas should also be prohibited during the breeding season, 15 April to 30 June, and this prohibition should extend throughout the year to herons, pelicans, cormorants, raptors, waders and Laridae. Full protection should also be accorded to the actual nests of all species.
- (d) Burning of reed-beds, clearing of riverine vegetation and felling of isolated trees should be forbidden in the Reserves.
- (e) The Government departments responsible for nature conservation should be consulted and their agreement obtained when water development or irrigation projects affecting the Reserve areas are being planned.

3. For the purpose of implementing the recommendations concerning the two 'Waterfowl Refuges', the following rules and regulations are advocated :-

- (a) No shooting of any species of bird throughout the year.
- (b) No motorboats to be used on the waters included in the Refuges during the period 28 December to 1 February except for fishing.

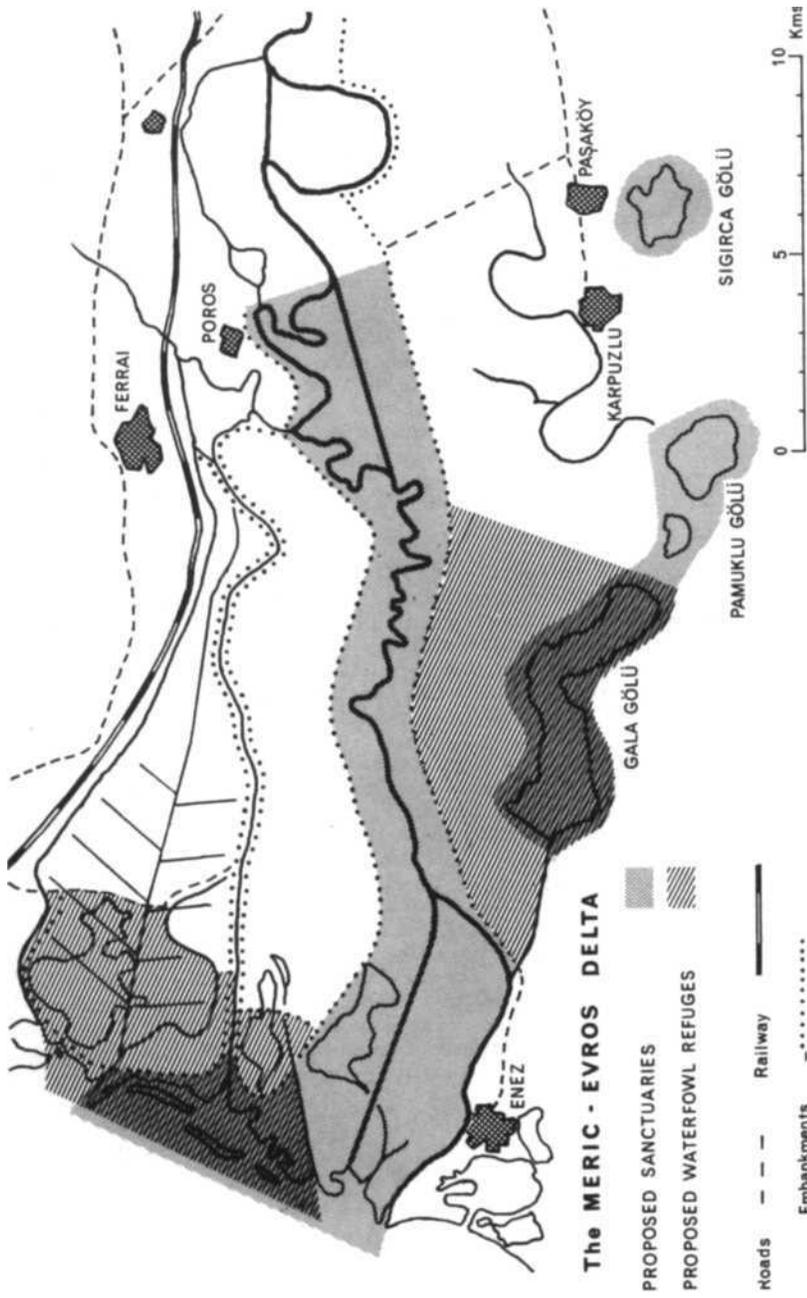


Fig. 25

4. Staff requirements.

Taking into consideration the size of the proposed Reserves, it is considered that two wardens would be required for the Turkish sector and two for the Greek sector. One of these, on each side of the border, should have a special responsibility for the safeguarding of the heronries.

for the proper control of the two no-shooting areas or Refuges, each would require two guards and the backing of the local police force, especially during the winter months when shooting is allowed in the Reserves and elsewhere in the delta area.

5. Long-term measures for the security of the protected and controlled areas.

The success of the plan recommended in this paper must greatly depend on the way in which its aims and objects are 'put across' to the people living around the delta, since naturally some of the measures proposed are likely to be rather unpopular. In particular the many sportsmen and hunters must be convinced that the prohibition of shooting in the two 'Refuges' is the only way to maintain wildfowl stocks and that this is very much in their true interests. It is to be hoped that the International Wildfowl Research Bureau can assist by providing material and information to support the 'educational' effort required.

It is important to realise that the mere creation of controlled and protected areas as recommended in this paper cannot by itself remove the dangers to the valuable fauna and flora of the delta which could arise from further extensive drainage projects. It is therefore essential that full contact and consultation between the departments concerned with wildlife resources and the authorities responsible for the Meriç/Evros project should be established as soon as possible.

Finally, it needs to be emphasized once more that in the overall land-use management of the delta the protection measures recommended in this paper are of a somewhat provisional nature. The detailed ecological research which would be needed for a comprehensive management plan has not yet been undertaken. Nevertheless the threats to the multi-purpose use of the delta are so obvious that, despite the lack of adequate ecological data, some immediate protective measures are urgently necessary and fully justified. The consolidation of protected areas and the eventual preparation of a first-class management plan, together with the scientific studies which would make this possible, would be greatly assisted if biological research stations, preferably open to specialist workers from all countries, could be established by the appropriate Greek and Turkish Universities situated within reach of this outstandingly important area.

LEGISLATION RELATING TO WILDFOWL RESOURCES IN
COUNTRIES OF THE MIDDLE EAST

- by -

Dr. L. Hoffmann

The International Wildfowl Research Bureau has for some time been collecting information on legislation relating to wildfowl in Europe and has edited a duplicated documentation on the subject. Only this year the enquiry was extended to south-western Asia, but up to the present, information has only been received from Cyprus, Iran, Iraq and Turkey. Nevertheless, since these countries are of great importance for wildfowl populations, especially during the winter, a brief synopsis of the information collected and some interim comments and comparative data on the results obtained, would seem to be justified.

- Wildfowl hunting seasons

Cyprus	:	24 October	-	31 March	=	157 days
Iran	:	22 June	-	22 March	=	270 days
Iraq	:	15 October	-	1 March	=	135 days
Turkey	:	1 August	-	31 March	=	240 days

In Iraq the hunting season is in strict accordance with the Paris Convention for the protection of birds, whereas the other three countries would have to abolish shooting in March (Iran also in June and July) if they wish to conform. In fact Iran has the longest wildfowl shooting season reported so far to the IWRB from any part of the world. Its commencing date of 22 June falls within the period when flightless young and moulting birds are still numerous.

- Protected species

In Iraq the Flamingo (Phoenicopterus ruber) and the Avocet (Recurvirostra avosetta) are protected, whereas in the three other countries all species of wildfowl and waders can be shot during the hunting season.

- Shooting licence

In all four countries a licence is required for wildfowl shooting. Converted into pounds, this costs approximately -

Cyprus	£2. 0s. 0d.	(a pound each for Game licence and gun permit)
Iran	£2. 16s. 0d.	

Iraq £5. 0s. 0d. for the first year (covering fire-arm licence and shooting licence)

£3. 0s. 0d. for subsequent years (£1 for the fire-arm licence and £2 for the shooting licence).

A shooting licence is issued at half-price to members of officially recognised hunting clubs or societies.

Turkey £0. 14s. 0d.

These licence fees, with the exception of the last, are equivalent to about the average charged in most European countries.

The minimum age at which a shooting licence can be granted is 21 in Cyprus and 18 in Iraq and Turkey; Iran has no age limit.

In all four countries shooting licences are valid for the whole country and a hunter can shoot everywhere except in places subject to special regulations for game protection (National Parks, Game Reserves etc.).

Income from shooting licences is credited to general Government revenue in Iraq and Turkey, but in Cyprus and Iran is credited to special funds used to maintain and improve hunting facilities.

- Number of licence holders

Cyprus	15,832	(general shooting licence)
Iran	11,695	(ordinary Bird Licence)
Iraq	no information	
Turkey	43,832	(general shooting licence : this is the 1964 figure and has probably increased since).

Compared with European standards the number of licence holders in relation to the area and wildfowl resources of the country is small in Iran and Turkey, but large in Cyprus.

No estimates of wildfowl kill are available, except in Iran, where it is believed to be between 200,000 and 1,000,000 birds a year.

- Hunting methods

Night hunting is forbidden in Cyprus, Iran and Turkey, but permitted in Iraq. In Iran trapping is permitted by night.

Covered butts, punt guns, live and artificial decoys are permitted or not forbidden in Cyprus, Iran or Iraq, but forbidden in Turkey.

Netting is now prohibited in all 4 countries.

Duck decoys and baiting are permitted or not forbidden in Cyprus, Iran and Iraq, but prohibited in Turkey.

Artificial light may be used for hunting in Iran and Iraq, but not in Cyprus and Turkey.

Motor boats may be used in Cyprus and Iraq but not in Iran and Turkey.

The use of poison is forbidden in Iraq and Turkey, but not subject to regulations in Cyprus and Iran.

Bag limits are not laid down in any of the four countries.

- Trade in wildfowl

The sale and transport of wildfowl are not subject to regulations in Cyprus, Iran or Turkey, but the sale is forbidden in Iraq. Import is unrestricted in Cyprus, Iraq and Turkey but controlled in Iran. Export is unrestricted in Cyprus, strictly regulated in Iran and forbidden in Turkey and Iraq.

- Egg collecting

Collecting of eggs of wildfowl and waders is permitted in Cyprus, but prohibited in Iran, Iraq and Turkey.

Conclusion

The documentation, collected by IWRB shows that wildfowl exploitation is subject to legislative regulation in all the countries from which data are available, but it does not show to what extent this legislation is at present enforced. It would be interesting to hear from the representatives of the various countries what is the situation in this respect. Only if existing regulations are really enforced, would it become worthwhile to make recommendations for their improvement.

Among the improvements which could then be suggested, abolition of shooting in March, June and July and full protection of certain species or groups of species might be the most urgent. Provision of funds for establishing a network of wildfowl refuges would be an equally important recommendation.

SIXTH TECHNICAL SESSION

Thursday 12 October 1967 : Ankara

GENERAL DISCUSSION

(a) Legislation

Although fairly good information about the laws affecting wetlands and wildfowl has been obtained from some countries and it is hoped will soon be available from the rest of the countries of the Region, very little is yet known of the degree of success in enforcing rules and regulations and there is a great need for details about this. Laws by themselves are of little value unless they can be enforced (Hoffmann).

In Turkey hunting laws have been in force for 30 years and their enforcement is a responsibility of the Forest Department, but up till now the supporting measures, staff and funds to ensure control have been inadequate. Under the new legislation which is being drafted it is hoped that a stronger system of control will be established. The legislation will include provision for wetland conservation, both of breeding and wintering sites, and also for conservation areas for particular species. About 23 of the latter are envisaged, including four or five for waterfowl (Turan).

Law enforcement depends mainly on effective administration and good organization, and unfortunately in Turkey the powers of the Forest Department are confined to Forest land. What is wanted is a special conservation department responsible for hunting, wildlife and wildfowl and making a clear differentiation between them. In planning this and the new legislation generally, it would be very useful to have full details from international organizations of what methods and procedures have been found useful and effective elsewhere (Bayer).

(b) Conservation and research programmes for wetlands

Conservation implies sustained yield and therefore, by definition, is not in conflict with development, though, just as one has museums and galleries for keeping objects and pictures which might otherwise be destroyed or lost for ever, so one needs to set aside some wetland areas for keeping species of flora and fauna in being. Whatever the objective in multi-purpose use of wetlands, it is essential to success to have and apply reliable costing methods. Just as essential is a basis of research which has the same theme as the International Biological Programme "biological production and human welfare" -, in other words a programme which would study wetlands in relation to the human community which lives round them. If this approach to research is adopted, wetlands can be properly managed to make an optimum contribution to the economy of a country and the wetland research stations, which should certainly be established and attached to Universities in the Region, would be of tremendous value in the long term to human welfare in general. For this reason research in molecular biology, a field in which most interesting possibilities have probably already been explored, is much less important than organismic biology as a subject demanding the attention of these Universities (Cragg).

The Camargue, which is really an island between the two branches of the River Rhone entering the Mediterranean, is a good example of wetland development. At the beginning of this century only 200 sq. km. out of the total of 750 sq. km. were under cultivation, the rest consisting of a mosaic of marsh and dry pasture, more saline in the vicinity of the sea. With the spread of vineyards, salt works and, since the war, ricefields, only 250 sq. km. now remain in a natural state. Yet, despite this, the species of birds and other animals, which flourished long ago, all still exist and some of them, even wetland species, have increased. We have now reached a more or less stable situation, with the local inhabitants not even wanting to extend cultivation, partly because it is more expensive and uneconomic to do so in the more saline sectors, but chiefly because of good profits obtained from shooting, from visitors who just want to see the flamingoes and other birds or to ride horses, and from rearing horses and the famous black bulls. There are certainly many wetlands in the Middle East region where the same sort of pattern of development to optimum utilisation could be followed (Hoffmann).

It is interesting that in the Camargue the majority of the bird species for which the area is renowned can be seen and photographed in 'developed' areas, without entering the strictly reserved areas at all (Elliott).

The fish production of wetlands, as a source of protein, is also very important and the development of the existing wetlands for this purpose is better than having to come along after they have been drained and incur the extra expense of constructing special fish ponds (Gürpınar).

The papers and discussions have shown that wetlands have values which have not been very well appreciated in Turkey, but for the exploitation of which the co-operation of the Turkish Government with international organizations such as IUCN can certainly be relied upon. There will of course be problems but these can be solved by such co-operation. It would obviously be sensible to proceed as quickly as possible with the assessment and classification of wetlands so that conservation measures can be applied first in the more important and urgent cases (Üner).

In connection with international co-operation it should be remembered that IUCN itself can give moral support rather than material. The International Biological Programme is much concerned with the classification of wetlands (through its C T section) and research into such things as Phragmites productivity problems (P T section), but it is necessary as a first step for the country concerned to set up its own IBP national committee and plan its research stations and programmes, so as to qualify for international support (Cragg).

A realistic approach is essential. Most people would now support wetland conservation in principle, but it is not enough just to put up a "Reserve" notice-board; what is essential is a management programme to solve the problems such as salinity and pollution control that are bound to occur, as various pressures build up, as they have done even in the Camargue (Lewis).

One management practice which deserves mention, from the point of view of wildfowl production, is positive improvement of the environment. This is widely adopted in America and may include the use of dynamite to make open water areas in dense Phragmites, introduction of food plants, even the cultivation of an agricultural crop such as millet specifically for the birds (de_Vos).

It is worth emphasizing the great variety of wetlands in a country like Turkey, ranging from coastal marshes to high mountain lakes. In my experience as a hunter the latter are often especially good for wildfowl, as well as being in very beautiful country. But there is disturbing evidence of a decline in numbers of wildfowl, for reasons which have been made clear at this meeting, especially habitat destruction, and this seems even to be happening in the great wetland areas of the U.S.S.R. (Erençin).

From the point of view of the Government, which must give particular attention to agricultural and economic requirements, the inter-relationship between wetland, land use and soil erosion problems is the most important consideration. The conservation and type of utilization to be applied to each wetland should be a matter of selection based on research and the subsequent management programme, which is equally important, also needs to be based on research (Bayer).

It is by material contributions to this research and participation in it by scientists of different countries, that international support can be most useful (Löffler).

The aim of conservation and management can be summed up as the maintenance of the quality of the human environment (Cragg).

(c) The MAR Project

It may be helpful to clarify the aims of the Project, since there still seems to be some misunderstanding about it. Basically its purpose is to make the significance and value of wetlands more widely known and understood. A specific and important part of this is the establishment of a List of wetlands. This has now been done for Europe and I hope the Meeting will agree that a similar List for south-west Asia should now be prepared.

In selecting wetlands for inclusion in the List the presence or absence of waterfowl has been chosen as a convenient indicator, but as has been shown in the discussions this does not mean that when an area is listed, economic development for other purposes, as well as for waterfowl, is meant to be excluded. It is true that in the development plans of any listed MAR area, it is hoped that at least some part of the area will be set aside for the needs of waterfowl, although in Middle East conditions even this may not always be necessary where what Mr. Savage has called 'effective reserves' exist.

The usefulness of the List is, first of all, that the presence of large numbers of waterfowl shows that a wetland is likely to be a productive one and therefore merits detailed biological attention and

survey. Secondly, from the point of view of conservation, the listing of an area is a good starting point. Out of a little more than 200 areas included in the first List, conservation problems have arisen in 36 instances, having been brought to notice by Governments, Associations and private individuals. As a result of this, previous plans for drainage or other development have been reconsidered, and sometimes modified or even abandoned, for the general benefit of all concerned; in eight cases new and valuable reserves having been created. The List therefore has definitely served a useful purpose.

Finally, I should add that an important aim is to secure Government recognition or a Governmental status for the listed wetlands. Good progress has been made with this and at the Second European Meeting on Wildfowl Conservation in May 1966, delegates of about 20 countries approved the List, with certain alterations, and recommended that an International Convention in support of it should be drafted and submitted to Governments for ratification. Work on this is now in hand (Hoffmann).

The procedure for compiling the List is quite a lengthy one, since it involves collecting a considerable amount of information from Governmental and other agencies. This information is intended to provide not only a general assessment of the importance of each wetland, based primarily on ornithological data since, as Dr. Hoffmann has said, this is often the only scientific data available, but also to define its place in a preliminary ecological classification (coastal waters, shallow coastal lagoons, coastal marshes, shallow inland salt, brackish or alkali water, shallow static inland fresh-water, shallow flowing inland fresh-water, inland fresh-water mineral-marshes and peatland), and to give details of size and any other general information available. The result is that apart from the areas finally selected for the List, for which the relevant data are summarised, so that people may be encouraged to fill the gaps, there is also a great deal of other useful information on the WEB files (Olney).

For the countries of this Region it would seem appropriate to use the provisional lists of wetlands included in the papers which have been presented, as a working basis, but not to attempt any final selection of those which should be included in the MAR List, until the work of collecting the data (including data on limnology, vegetation and general ecology) has been done and the areas can be reliably classified. It is important that the data should be collected and recorded in a standard form. If this approach is used, land-use planners will be able to advise which wetlands or which section of a wetland should be reserved in some way and for what purpose (de Vos).

In the case of Turkey it will be necessary to take into account that some wetlands or parts of wetlands included in the provisional list are already designated for drainage or development and, therefore, some deletions or additions of other substitute areas will probably have to be made. The vegetation map of Turkey, which the DSI is expecting to issue in 1970 will also have a bearing on the description, classification and final selection of areas. This selection, in accordance with DSI policy over the last ten years and the master-plan being prepared by the Forest Department, should be based on hydrological, soil and other appropriate surveys, and it is clear from this Meeting that these

surveys should include biological, faunal and ecological studies which have so far been lacking, due partly to the fact that it is uncertain which Department should be responsible for them.

With regard to some of the particular wetlands which have been discussed, only about 100,000 ha. out of a million hectares of the Meriç delta which could be put under irrigation have yet been used for this purpose and it ought to be possible to ensure that adequate areas are allocated for wildfowl conservation and hunting, tourist development generally, including all kinds of recreation, and also forestry. In the Amik Gölü area it has already been decided to establish a wetland reserve of 5000 ha.

The DSI is very interest in the new legislation which has been proposed and appreciates the need for effective enforcement. It considers that it should cover such topics as wetland conservation and development, including reclamation and all the economic, touristic and aesthetic aspects. The Department would also be ready to collaborate fully in the kind of surveys which Professor de Vos recommended (Varişligil).

The policy just described for the Meriç delta and the establishment of a reserve at the Amik Gölü are very satisfactory and it is to be hoped that wildlife conservationists will be fully consulted about the consequent management of these areas. The need for a great deal of detailed survey and research is appreciated, but, from the wildfowl point of view, the decline in numbers and the threats to their habitat make it essential and urgent to establish a provisional MAR List, which can be modified and improved to meet long-term research, conservation and management needs, as new information becomes available from the survey work (Hoffmann).

A difficulty which has to be faced in a country like Turkey is that there are still not enough experts and not enough being trained at the Universities in this particular field. Moreover, the visiting specialists from other countries or international tend not to have enough time for their work. They stay for two or three months, but really need at least a year (Hug).

The provision of experts under international aid programmes, such as the United Nations Development Programme, depends a good deal on the priority attached by the Government making the application and there is also a better chance of success if a project can be worked out on a regional basis. It is sometimes easier to make use of a well-established bilateral aid programme, such as the one operated by the Canadian Government (de Vos).

This question of priorities is always a difficult one in developing countries, since there are so many social and economic problems demanding priority (Bayer). Nevertheless, despite the difficulties of implementation, the extension of the MAR Project to Turkey and the classification and listing of the country's wetlands are very important and should be acceptable to the Government (Asmaz).

The Chairman, Dr. J.B. Cragg, after thanking all those who had presented Papers and contributed to the discussions, formally closed the technical sessions of the Meeting at 17.30.

THE FIELD EXCURSIONS

Ankara - Bursa - Istanbul

Friday to Sunday 13 - 15 October 1967.

This Report would be incomplete without a brief account of the enjoyable and interesting excursion organized by the host Government and the Turkish Association for the Conservation of Nature and Natural Resources. Although time and the distances to be covered precluded detailed study of any of the areas visited, a very good idea was obtained of the general character of the north-west Anatolian plateau and of the Marmara coastal plains, in relation to the main features and problems of some of their more important wetlands.

Leaving Ankara on the first morning and after brief stops at Pskişe and near Yassihöyük, the party spent about an hour at the Balıkdanı swamps on the upper Sakarya river south-east of Sivrihisar, a potential (and to some extent already partly developed) multi-purpose wetland area, supporting considerable numbers of domestic stock as well as a great variety of waterfowl, but understood to be under threat from water-development projects further upstream. The next stop, at the 'picnic area' near Çifteler, offered the contrast of a lake and lake-shore, also near the Sakarya river, extensively modified and developed for recreational purposes. The party then continued its journey to the Forest Department station near Eskişehir, where a wonderful meal of country produce was enjoyed and the ornithologists found considerable numbers of migrant birds in the gardens and orchards. Bursa was finally reached after nightfall.

The second day started with a short visit to the üluabat Earth-Dike area on the south-west of Lake Apolyont, where both species of pelican, black storks, sea eagle and many other species were seen in an area obviously of great ornithological value, part of which could well be set aside as a reserve. The greater part of the day was, however, spent at the Lake Manyas 'Bird Paradise' National Park. Although most of the breeding species for which this is famous had departed, the interrelationship of the various habitat types proved to be of the greatest interest. A very favourable impression was obtained of the potentialities of the Park both for scientific and recreational purposes, provided that the very real difficulties in reconciling these two objectives are imaginatively tackled and successfully resolved.

Due to shortage of time, the third day of the excursion was eventually confined to sightseeing in Bursa and to the journey by road, past Lake Iznik, to Yalova, where the party embarked for the sea voyage to Istanbul, made under perfect conditions. It would be appropriate to mention, in conclusion, that after the final morning's session at Istanbul on 16 October, many of the participants were able to enjoy an additional excursion to the Belgrad Forest north-west of the city, at the invitation of the Director of the State Forestry Institute, Mr. Hikmet Bayşu. This is now a fully protected area of great interest, not least in having a number of ancient dams, built to supply Istanbul with water but showing the value of even quite a small artificial 'wetland' asset from a wildlife point of view.

CLOSING SESSION

Monday, 16 October 1967 : Istanbul.

Dr. L. Hoffmann took the Chair for the Session, which was held in the Kerim Erim Conference Room of the Science Faculty of Istanbul University by kind permission of the Dean of the Faculty, Professor Lütfi Biran.

The Session was opened by the Governor of Istanbul, Mr. Vefa Poyraz, who welcomed to the city and expressed his thanks and good wishes to all those who had helped in the organisation of the Meeting and had participated in its discussions. He emphasised that these were of special interest in Turkey, because the country was well endowed with wetland resources and was therefore deeply concerned with aspects of these resources which had been specially studied at the Meeting, including the maintenance of habitat for migrant and other wildfowl and the utilisation of wetlands for hunting and fishing on a sound and continuing basis. He hoped that participants would enjoy their short stay in Istanbul and that one day the city might be chosen as the site of an IUCN General Assembly.

After a message of welcome and support for the aims of the Meeting, had been read on behalf of the Dean of the Science Faculty, the Chairman was asked by Mr. W.H.N. Wilkinson for permission to make an announcement and accordingly called on Mr. Wilkinson, who spoke as follows:

"Formation of a Turkish Ornithological Society

We should like to announce to the Meeting that a Group of us, Turkish and foreign, are launching an Ornithological Society for Turkey. This proposal was included in Mr. David Lea's paper on Lake Manyas and we thought that in the atmosphere of interest and enthusiasm generated by this Meeting it would be propitious to carry this proposal into effect.

Although the Society's structure has still to be defined, and its formal constitution drawn up, the broad outlines have already been decided upon. It will be international in its membership and operations. It will have a Turkish president or chairman, two secretaries, one Turkish and one foreign, two treasurers, one in this country and one abroad, and it will publish its journal annually in Turkish and in English. We invite you all to join, and everyone interested should give their names and addresses, if Turkish to Mr. Tansu Gürpınar, and, if foreign, to Mr. David Lea or myself.

The aims of the Society will be -

(1) To engender and foster an active and increasing interest in Turkey in birds which form such a valuable part of the country's heritage. Our eventual ambition is to see an ornithological society in every university, college and school throughout this magnificent country.

(2) To encourage the study of Turkey's birds and to collect the information necessary so that appropriate protective measures can be

initiated in time, if any particular species should come under threat.

(3) As birds are an international study and responsibility, to work with other ornithological and conservation institutes on an international basis.

(4) To act as an information centre inside Turkey for all relevant ornithological information.

Inside Turkey we shall seek to co-operate closely with all official and private bodies such as the Forestry Department, the Devlet Su Isletmesi, the National Parks organisation, the various Ministries involved and, most important, the Turkish Association for the Conservation of Nature and Natural Resources, the universities, schools and research institutes.

In order to encourage membership the individual subscriptions will be small, but we shall seek additional contributions, grants and donations from whomever we can - individuals and organisations.

The Society's funds will be spent under the following headings:-

(1) Publication of an annual journal in Turkish and English: the money for the first issue has already been donated.

(2) Establishment of a project fund: under this heading a joint Turkish and foreign expedition is planned for 1968 next year to conduct further investigations and to gather additional information about certain Turkish wetlands for submission to the editor of the MAR Project List for the Region.

(3) Education: we hope to carry out a census of storks nests throughout the towns and villages of Turkey with the help of school-children. This could be an imaginative and yet simple move to arouse an interest in ornithology. If funds are sufficient we would also like to make money available for Turkish ornithologists to enlarge their experience by short periods of study abroad.

(4) Regrettably, we shall have to spend something on administration but we will keep this as low as we possible can.

Turkey's birds are important internationally as well as nationally. We believe that if this Society carries out its objective dynamically it can make an important contribution not only to Turkey but to the world. We therefore commend it to this Meeting and hope that we have not forfeited your goodwill by this usurpation of your time."

The announcement was warmly applauded and the Chairman proposed that a paragraph, welcoming and approving it, should be included in the Conclusions and Recommendations of the Meeting. He then called on the Secretary of IUCN's Commission on Ecology, to present the draft Conclusions and Recommendations for discussion.

Sir Hugh Elliott prefaced his presentation by explaining that the Conclusions were intended to reflect the main points which had emerged

from the technical sessions and which had clearly commanded general approval. The Recommendations, on the other hand, although also based on views which had been put forward and endorsed at the Meeting, had been drafted with a view to submission to the Boards and Councils of the three sponsoring international organisations, in order that, if they approved them they should authorise the requisite action to be taken to promote their implementation. In drafting the Recommendations special attention had therefore been paid to the practical possibility of putting them into effect with the co-operation of the national and international organisations concerned. The Recommendations, if approved, would be supported in the Report of the Technical Meeting by brief appendices covering any points of detail which it was thought would be helpful in achieving their objectives.

The draft Conclusions and Recommendations were then read, discussed and, after due note had been taken of all proposals for amendments and additions agreed by the Meeting, formally adopted. The approved text, together with appendices, is set out at the end of the Report.

Votes of thanks and appreciation to the Chairmen, Dr. L. Hoffmann and Dr. J.B. Cragg, and to the Secretary of the Ecology Commission, Sir Hugh Elliott, having been moved by Prof. N. Polunin and adopted unanimously, the Chairman announced that arrangements had been completed for the Third International Meeting on Wildfowl Conservation to be held in Leningrad in the second half of September, 1968, at the invitation of the Minister of Agriculture of the Soviet Union. This would be a great opportunity for following up many of the conclusions and recommendations of the present meeting in Turkey, and he hoped that representatives from Turkey and the other countries of the Middle East region would be able to attend and take full advantage of it. The present Meeting had done much to create an atmosphere of profound mutual understanding and friendship, thanks to the wonderful hospitality and excellent organisation and facilities provided by the host country, Turkey. He was sure that all who had participated would join him in expressing their deepest gratitude to each and every one concerned.

Finally, the Chairman called on Mr. Zekâi Bayer, Vice-President of the Turkish Association for the Conservation of Nature and Natural Resources and head of the National Parks Division of the Directorate-General of Forests of the Government of Turkey, to close the Meeting.

Mr. Bayer recalled that IUCN had been founded in 1948 under the auspices of UNESCO, then almost the only one of the great international Governmental agencies concerned with the conservation of nature and natural resources, but now joined in this field by many other organisations including the Economic and Social Council of the U.N. itself, F.A.O., the Council of Europe and the O.E.C.D.

The idea of the present scientific Meeting had originated at the Ninth General Assembly of IUCN held at Lucerne, Switzerland, in 1966, when Turkey had been proposed as a venue. This was not the first time that IUCN had had close co-operative and technical contacts with Turkey: in 1963, for example, the same year as that in which the Turkish Association for the Conservation of Nature and Natural Resources had

been authorised by Ministerial Council Decree to become a Member Organisation of IUCN, the International Commission for National Parks of IUCN had sponsored the survey and preparation of a management plan for the Uladag National Park, which had been carried out by an expert of the Canadian National Parks Service. For the present Meeting another of IUCN's six Commissions, the Commission on Ecology, had been responsible for planning the technical programme.

Mr. Bayer welcomed the proposals and recommendations which had resulted from the Meeting and, in particular, those which were of particular interest to Turkey and to which he felt sure his Government would give careful consideration - the establishment of a wetland research centre, the extension and implementation of the MAR Project and the conservation plans for the Manyas Kuş Cenneti and the Meric delta. He emphasized, however, the key role of education and training in reaching such objectives successfully and hoped that international support would be available in this field. He felt bound to add that by far the most important factor affecting nature conservation in Turkey was soil erosion. It was for this reason that the Turkish Association for Conservation of Nature and Natural Resources had concentrated its attention on soil erosion problems and on the rational exploitation of natural resources especially in their relationship with agriculture, which occupied the most important place in the national economy.

Mr. Bayer concluded by thanking the Ministries and Universities, administrators and officials, who, under the leadership of the Ministry of Agriculture, were showing a close interest and extending every help in the work of the Association on the many different problems of conservation. The Association was grateful to all those who had assisted in the organisation of the present Meeting, particularly the University Faculties which had put their facilities at its disposal, and to all the participants who, in their discussion of the conservation of natural lakes and wetlands, had contributed to an important development as far as Turkey was concerned in the approach to the conservation of nature and natural resources. The Association would do all in its power to implement the results of the Meeting, which with a final salutation he now declared closed.

TECHNICAL MEETING ON WETLAND CONSERVATION

Ankara - Bursa - Istanbul, 9-16 October, 1967.

CONCLUSIONS AND RECOMMENDATIONS

In view of our discussions at the six Technical Sessions of this Meeting, for which thirty-four papers were specially contributed and six previously published papers were also made available by organizations and authors concerned, and in view of our visits to several Turkish wetlands of great interest and importance, we have at this Closing Session at Istanbul, on Monday 16 October 1967, agreed upon the following general conclusions:

CONCLUSIONS

1. Conservation of natural resources, by which we mean the utilization of such resources on a sustainable basis in the best interests of humanity, is essential to sound economic planning in every country, has become increasingly urgent because of growing populations and the impacts of modern technology, and is above all necessary if the quality of the human environment is to be maintained.
2. Wetlands, by which we mean areas of permanent or seasonal marsh and shallow water, fresh or saline, inland or coastal, are of a specially high priority and merit most careful attention from a conservation point of view, because of the wide scope and productivity of their resources and the fact that they are very vulnerable to bad management practices, the effects of which may be difficult and expensive to rectify.
3. The wetlands of the Region with which we have been concerned at this Meeting, namely those of the countries of the Middle East from Turkey to Pakistan with the neighbouring countries to the north and south, are of particular importance because of their high existing and potential level of production and because many of them are situated in rather arid surroundings, which enhances their aesthetic and recreational as well as scientific and economic values.
4. The Reports submitted to the Meeting under the auspices of the International Wildfowl Research Bureau and, in particular, the information we have been given on numbers and movements of wildfowl populations breeding in the U.S.S.R., show that a significant proportion of the wildfowl stocks of the world use the Middle East wetlands on migration or as winter quarters. It has also been noted that some of these wetlands are nesting sites for certain wildfowl species which have become generally scarce under threat and therefore in need of special protection.
5. The existing evidence suggests that many of the Middle East wetlands are capable of being developed, managed and fully utilised without major changes to their general character and without

risking the disappearance of wildlife (fauna and flora) resources, while at the same time producing a comparable economic return to that which would be obtained by drainage or other total modification.

6. Wetland development and management is of vital concern to the over-all land-use planning of every country and the key to success lies in the principle of zoning for multi-purpose use. Zoning can be applied both on a spatial and a temporal basis; for example, in a major wetland, it will usually be desirable and practicable to allocate areas either permanently or seasonally to protection of fauna and flora and to hunting, as well as for agriculture, pasture, fishing, reed-cutting, recreation and other activities depending on plentiful water.
7. Multi-purpose zoning is applicable not only to natural wetlands but also to water bodies constructed for domestic, industrial, irrigation, hydro-electric or other purposes. For example, it is often possible by good planning, preferably at an early stage of a project, and by subsequent management, to adapt part of an artificial water for wildfowl use and, in so doing, actually increase wildfowl stocks without any adverse effect to the primary use of the water or other secondary uses such as fishing and recreation,
8. In some countries and circumstances, it may be necessary to introduce alien species of flora or fauna in order to develop the potential productivity of a particular wetland. In view of the many dangers associated with such introductions, the most careful consideration and thorough research are always necessary to guard against a possible resulting deterioration of the existing ecosystem, which it may be impossible or costly to reverse.
9. The maintenance and rational utilization of wildfowl, the wetland resource which has been the particular concern of this Meeting, can only be assured by a combination of governmental control and well-informed public opinion. The announcement at the Meeting of the Turkish Government's acceptance of the legislative implications of the International Convention on Bird Protection and the further announcement of the formation of a Turkish Ornithological Society are therefore particularly welcome.
10. An essential aim of these and similar initiatives, such as that taken at the Second European Meeting on Wildfowl Conservation (1966) towards a new International Convention on the subject (an initiative which is commended for further study), is to secure active co-operation of all users of wetland resources. For this purpose legislation and association need to be supported by the use of all available media for the promotion of conservation education. For example, it is only when hunters and fishermen, on the one side, and scientists, biology teachers and students on the other, realise how closely their interests are allied and work together accordingly, that a sound conservation programme can be evolved and implemented.

Our specific recommendations arising from these general conclusions are set out below.

RECOMMENDATIONS

1. Project MAR

It is recommended that the MAR Project for conservation and management of temperate wetlands, which is jointly sponsored by the International Union for Conservation of Mature and Natural Resources, the International Council for Bird Preservation and the International Wildfowl Research Bureau, should be enlarged and extended to the Middle East region and that steps should be taken accordingly to implement the first stage of the extended Project by preparing and publishing a List of the wetlands of international importance situated in the Region.

For this purpose, the names and details of wetlands suggested for consideration in papers submitted to this Meeting are commended as a suitable basis for the provisional lists which would be circulated to governmental authorities, interested institutions and experts, for assessment and selection.

2. International Biological Programme

In view of the importance of intensifying the scientific study of the wetland areas of the Region, with special reference to the evaluation of their productivity, the establishment in every country concerned of a National Committee for the IBP is strongly recommended.

From the point of view of wetland conservation, such National Committees should as soon as possible appoint sub-committees for the sections of the Programme dealing with the Conservation of Terrestrial Communities (Known as CT) and Productivity of Terrestrial Communities (Known as PT). The Productivity of Freshwater Communities (PF) and the Utilization and Management (UM) sections of IBP are also relevant to the development of wetlands.

3. Official support for wetland investigations

The successful implementation of both the previous Recommendations is dependent on official support and encouragement. It is therefore earnestly recommended that Governments and all Departments and governmental institutions concerned with natural resources should assist and facilitate wetland research at all levels, including detailed scientific studies under the International Biological Programme and the carrying out of the surveys, censuses and carefully controlled bird-ringing programmes needed to solve the wildfowl conservation problems which have been a principal concern of this Meeting.

Since the multi-purpose use of wetlands which we advocate, requires co-operation between many different Government and University departments, we would also emphasize the important role of organizations interested in the whole field of natural resources, such as the Turkish Association for the Conservation of Nature and Natural Resources, which has played so large a part in the organization of the present Meeting and in ensuring an inter-disciplinary approach in our discussions of the problems of wetland conservation.

4. Wetland Research Centre for Turkey

In order to provide a focal point for wetland research and to give a lead which it is to be hoped will be followed throughout the Region, the Government of the Turkish Republic and the Departments concerned are urged to plan the early establishment in Turkey of a Research Centre for Wetland Conservation with the following objectives:

- a) To organize wetland research on a co-ordinated basis, in which geological, pedological, hydrobiological, botanical and zoological departments of the Government and Universities are encouraged to make their proper contributions;
- b) To collect, analyse and make available through a comprehensive system of documentation, all existing and future information available on Turkish wetlands;
- c) To make full use of co-operation and technical assistance under international and bilateral arrangements, including the exchange of specialists, teachers and students working in the field of wetland research, between Turkey and other countries.

5. Lake Manyas Bird Paradise National Park

The Meeting congratulates Turkey on the steps which have been taken over the past years to establish, develop and provide effective management for this extremely important sanctuary. It recommends that in carrying out and completing the developments which are planned and in designing the future management policy, very careful attention should be paid to the zoning principle referred to in the sixth Conclusion of this Meeting, in order to ensure that the multiple values possessed by this remarkable area are not allowed to deteriorate.

In particular, we support the recommendation made by the Council of Europe's visiting expert that the section of the development area situated between the existing buildings and the nesting colonies of herons, spoonbills and cormorants, would be highly suitable for planting with shrubs and trees such as tamarisk, thus helping to diversify the habitat and keep this critical part of the sanctuary reasonably undisturbed. On the other hand if it were used as a car-park or recreation ground, the effects could well threaten the survival of the nesting colonies, even though only a few persons were allowed to enter the particular area during the breeding season.

Plans for establishing recreational and educational sections of the National Park are also warmly supported. A special zone needs to be allocated for this purpose, not less than a kilometre from the zone of the wild bird colonies and preferably accessible to local commercial enterprises, so that neighbouring villages may acquire a material interest in the maintenance and success of the Park. It is much to be hoped that the small additional area that would no doubt be necessary for this purpose, can be acquired.

6. The Meriç Delta

In view of the general importance of the Meriç River delta to both Turkey and Greece, and taking special account of the vital part it plays in the economy and maintenance of the waterfowl stocks of a wide region, as a breeding-ground, resting-place on migration and winter-quarters, the broad outlines of the plan presented at this Meeting by Mr. Günther Müller, covering certain aspects of the future development of the area, are supported. In particular it is recommended that in the area south of Ipsala,

- a) a zone is demarcated and managed as a sanctuary where no shooting would be allowed;
- b) a second zone is allocated as the main shooting area, where under proper control and on a sustained yield basis the interests of sportsmen and wildfowlers can be permanently satisfied.

It cannot be emphasized too strongly that an effective management and land-use system not only for these two reserve areas but also for the whole complex of the river and its delta, needs to be worked out and implemented, if the magnificent fauna and flora are to be conserved and utilized.

7. The Niriz Basin and neighbouring wetlands of Iran

The two studies of this area presented and discussed at this Meeting have shown the high interest and importance of this wetland complex and certain other smaller wetlands situated near the city of Shiraz and its University. It is strongly recommended that the attention of the Government of Iran should again be drawn to the findings of its Game and Fish Department and of the Biology Department of the Pahlavi University concerning wetlands in the Province of Fars, notably:

Lake Niriz itself
Lake Parishan (Famur)
The Bam-e-Shur marshes of Lake Maharlu

All these areas are very suitable for a wide range of studies, which should include research into their economic utilization, passage and wintering of wildfowl, and the breeding incidence of such species as flamingo and pelican, the value of which is enhanced by the fact that they are a potential tourist attraction. The creation of reserves in these areas to ensure that their resources are maintained for scientific study or other forms of utilization, as well as the institution of appropriate management policies for that purpose, are commended for urgent attention.

APPENDICES TO THE RECOMMENDATION

(1) Recommendation on the MAR Project.

It is suggested that, in the case of Turkey, the first draft list of wetlands which might be considered for inclusion in the MAR List for the Middle East and south-west Asia, should be based on the lists contained in the paper by Mr. Nihat Turan (pages 92 to 93) and the paper jointly prepared by Messrs. Savage, Porter and Wilkinson (pages 94 to 95).

For the other countries of the Region, the Lists contained in the series of five 'Wetlands and Wildfowl' papers by Mr. C.D.W. Savage are recommended as a working basis.

It will be the responsibility of the International Wildfowl Research Bureau (Director, Dr. L. Hoffmann, Station biologique de la Tour du Valet, 13 le Sambuc, Prance) to initiate the necessary consultations with authorities and individuals, in order to complete the data and carry out the assessment on which the final selection is based. For this purpose it is likely that a special co-ordinator and editor will be appointed, but in the meanwhile relevant ecological information from all persons visiting or familiar with any of the provisionally listed areas would be extremely welcome and should be sent to the IWRB at the address noted above. Details of the presence or absence of waterfowl, whether breeding, wintering or on passage, are particularly required since, for the purposes of the MAR Project, such presence or absence has been adopted as a convenient and practical indicator of the status of wetland areas.

(2) Recommendation on the International Biological Programme.

The Central Office of the IBP, under the control of its Special Committee (SCIBP) which was established by the International Council of Scientific Unions at its 10th General Assembly at Vienna in November 1963, is situated at 7 Marylebone Road, London N.W.1. England, (Scientific Director, Dr. E.B. Worthington). The organisation and aims of IBP are set out in the pamphlet "IBP: what it is, what it does" obtainable from the Central Office. The first issue of the periodical "IBP News" (November 1964) summarised them as follows:

"The rapid rate of increase in the numbers and needs of the human populations of the world and their demands on the natural environment, has greatly increased the need for biological research. The International Council of Scientific Unions (ICSU) has therefore initiated an International Biological Programme (IBP) entitled 'The Biological Basis of Productivity and Human Welfare', with the objectives of ensuring the worldwide study of:

(1) Organic production on the land, in fresh waters, and in the seas, and the potentialities and uses of new as well as of existing natural resources and

(2) Human adaptability to changing conditions".

The Programme has six Sections: Productivity of Terrestrial Communities (PT), Production Processes (PP), Conservation of Terrestrial Communities (CT), Productivity of Freshwater Communities (PP), Productivity of Marine Communities (PM), Human Adaptability (HA) and Use and Management of Biological Resources (UM).

The organization of the Programme is based on National Committees, which have usually been set up on the initiative of biological faculties of Universities and other appropriate scientific institutions and individuals and with Governmental backing. Sectional sub-committees for the six Sections of IBP are also established nationally to the extent that may be practical and desirable. In the Region under review at the Technical Meeting a National Committee has so far been set up in Israel and the Central Office of IBP has correspondents in Iran, Pakistan and Jordan. Promotion of additional National Committees is planned for 1969, but earlier initiatives from the countries concerned would be welcomed.

From the point of view of wetland conservation, studies which would be of special interest to IBP in the Region might well include Phragmites productivity and utilisation, plant succession, optimum use of wetland pastures and wildfowl productivity.

(3) Recommendation on official support for wetland research.

Apart from research programmes, referred to above, which in due course may be initiated under IBP and would necessarily require material support from the Governments concerned, co-ordination and organisational facilities are essential for such investigations as the IWRB winter Wildfowl Counts and, in most countries, can only be provided by Governmental intervention and assistance.

(4) Recommendation on a Wetland Research Centre.

It is probable that the implementation of this recommendation and subsequent exchange of specialists between the Centre and suitable institutions abroad for research and training purposes, will involve recourse to technical aid programmes. In addition to the United Nations Development Programme, it is suggested that consideration should be given to the possibility of assistance from regional organisations, such as the Council of Europe, bilateral aid facilities offered by several countries (e.g. Germany, Canada, U.K.) and non-governmental organisations, including IUCN. It is important, however, to appreciate that the latter are not in the position to offer financial assistance, but only to provide a channel for contact with suitable experts and, in special cases, with grant-giving bodies such as the World Wildlife Fund, where the aid required can be arranged on the basis of a Project within its field of interest.

Since, for the purpose of obtaining technical aid, Government sponsorship and the allocation of a reasonably high priority are essential, it is recommended that investigation of ways and means of implementing this recommendation should be made the specific responsibility of an appropriate division or department of a Ministry concerned with wetland resources.

(5) Recommendation on Lake Manyas Bird Sanctuary.

For the purposes of drafting this recommendation, opportunity was taken of consulting a first draft of the section concerning 'Recommendations for Management' of the detailed Report on the Manyas Sanctuary to be submitted to the Turkish Government by Mr. David Lea, Reserves Manager and now Deputy Director of the Royal Society for the Protection of Birds in the United Kingdom. This Report was being prepared under the aegis of a technical aid project sponsored by the Council of Europe and the recommendations referred to were considered to be very sound, in the light of observations made on the visit to Manyas during the Field Excursion.

From the point of view of immediate urgency, Mr. Lea's recommendations for the development of the 'in-filled' area between the existing buildings and the nesting colonies and for the development of an additional and separate recreational area, were clearly of special importance and therefore reflected in the Recommendation adopted by the Technical Meeting. However, his other suggestions, including those for visitor control, the siting and construction of the Gar Park and a visitors' information building and, particularly, for the siting and mode of construction of four 'Hides', including one tower hide commanding a view of the main heronry, from which visitors can see and enjoy the birds without disturbing them, are strongly commended to the Turkish authorities. There is no doubt at all that development of the area on the lines suggested would make the Kuş Genneti a top-class attraction for local and foreign tourists and also a most valuable educational influence, without in any way impairing its scientific interest.

(6) Recommendation on the Meriç delta.

The two features of the Meriç delta area which need special emphasis are: the great variety of the habitats which it offers, several of them now almost unique in the eastern Mediterranean region, and, because of this, the occurrence, whether as breeding or wintering species, of birds which are rare or diminishing elsewhere, but are here found in substantial numbers, sometimes comprising almost the whole of a particular population. The concentration at certain seasons of birds of prey is a noteworthy example.

(7) Recommendation on Lake Niriz and other wetlands.

Although the papers presented at the Meeting were confined to the situation and needs of the Lake Niriz basin, it was decided to include under the recommendation two other areas situated between Niriz and Shiraz, because of their intrinsic interest and contrasting limnology, flora and fauna, and also because their proximity to the Pahlavi University of Shiraz makes them highly suitable and convenient for biological research. A proper network of reserves covering all three areas would allow the development of a comprehensive programme of research of great scientific and conservation value.

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